**Project Report Format**

IoT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

# INTRODUCTION

* 1. Project Overview
  2. Purpose

# LITERATURE SURVEY

* 1. Existing Problem
  2. References
  3. Problem Statement Definition

# IDEATION AND PROPOSED SOLUTION

* 1. Empathy Map Canvas
  2. Ideation and Brainstorming
  3. Proposed Solution
  4. Problem Solution Fit

# REQUIREMENT ANALYSIS

* 1. Functional Requirements
  2. Non-Functional Requirement

# PROJECT DESIGN

* 1. Data Flow Diagrams
  2. Solution And Technical Architecture
  3. User Stories

# PROJECT PLANING AND SCHEDULING

* 1. Sprint Planning And Estimation
  2. Sprint Delivery Schedule
  3. Report From JIRA

# CODING AND SOLUTIONING

* 1. Feature 1
  2. Feature 2
  3. Database Schema

# TESTING

* 1. Test cases
  2. User Acceptance Testing

# RESULTS

* 1. Performance Metrics

# ADVANTAGES AND DISADVANTAGES

1. **CONCLUSION**

# FUTURE SCOPE

1. **APPENDIX**

# INTRODUCTION

* 1. Project Overview
     1. The project is IoT Based Safety Gadget for Child Safety Monitoring & Notification. It is mainly streamed towards child safety solutions by developing a gadget that can be used to monitor the child.
  2. Purpose
     1. Child safety and tracking has been a huge concern due to the surge of the number of crimes on children. Hence the purpose of this project is to provide an application that can be used to ensure the safety of a child.

# LITERATURE SURVEY

# ABSTRACT- This paper is based on IOT (Internet of Things). As we know in the present era everything is based on digital technology. Human beings are going to connect to each other by using mobile networks. This paper proposes an SMS based solution to reduce parents' insecurity and schools to track children in real time. Different devices are connected with a single device through. The concerned device is connected to mobile via SMS. The device can be used by stockholders to track children and get real time data. The main Advantage of the proposed system is to send location by using a mobile network (GSM). Here a prototype model (device) is created which is hardware based. The work comprises ARDUINO UNO as microcontroller, along with GPS and GSM module. This device will also have the facility of different status of children by measuring the speed of hand movement of children.

# 

# Keywords: Child security system, Child monitoring system, Internet of Things (IOT), IOT device, Smart band

# I INTRODUCTION

# Nowadays, crimes always occur. This scenario is not involving adults only, but also happens to children. Parents concern more about serious cases such as missing children, abduction and rape. The crimes also involving school children have been reported in newspapers. Although the school has guards that are posted on school grounds 24 hours a day, that simply is not enough to monitor the student. The use of IOT in this device is motivated by the need for a child security system in Malaysia due to child safety issues resulting from increasing cases of child -related crime. The happiness of the parents is caring and helping the child to grow well in the beautiful world. But children are facing so many problems from the outside world. It may affect the mind to avoid having friendliness with everyone. And parents cannot sit with their children for 24x7 hours to secure their children and monitor the children's activities. When a child is going to school, then her security and activities are assured by the school and the members of school only.

# IOT in Child security:

# Now the modern world needs to have advanced things through composing different technologies for helping to find solutions for their real life problems. The new technology Internet of Things (IOT) provides much support for making advanced devices and tools to design and implement the solutions to real world life issues. Although some studies have looked into using personal monitoring methods for children based on wireless communication, We exploit such devices to monitor the location and activities of children and to proactively notify guardians of potential safety risks. After sending children to school, the parents may get the SMS about whether the child reached the school or not. If the system fails in the school, then the parents have made a call to the teacher to confirm about their child present in the school. But this manual approach may not give 100% satisfied results on all occasions. Hence the tracking sensor may give a 100% perfect result to the parents‟ smartphone about the status and location of their child. Here we have taken one more problem that the level of people who are near to the child.

# II. LITERATURE REVIEW

# [1] N.Senthamilarasi, N.Dhivya bharathi, D. Ezhilarasi and R.B.Sangavi:-Child Safety Monitoring System Based on IOT- NOV 2019 :

# The overall percentage of child abuse cases filed nowadays in the world is about 80%, out of which 74% are girl children and the rest are boys. For every 40 seconds, a child goes missing in this world. Children are the backbone of one’s nation, if the future of children was affected, it would impact the entire growth of that nation. Due to the abuse, the emotional and mental stability of the children gets affected which in turn ruins their career and future. These innocent children are not responsible for what happens to them. So, parents are responsible for taking care of their own children. But, due to economic conditions and the aim to focus on their child’s future and career, parents are forced to crave for money. Hence, it becomes difficult to cling on to their children all the time. 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.

# [2] M Nandini Priyanka, S Murugan, K N H Srinivas, T D S Sarveswara Rao, E Kusuma Kumari:-Smart IOT Device for Child Safety and Tracking :

# Child safety and tracking is a major concern as the number of crimes on children are reported nowadays. With this motivation, a smart IOT device for child safety and tracking is developed to help the parents to locate and monitor their children. The system is developed using Link It ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules. 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 an emergency. The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same. The above system ensures the safety and tracking of children.

# [3] P. Poonkuzhali1 , R.Aarthi 2 ,Yazhini.V.M3 , Yuvashree.S4 , Vidhyalakshmi .G:-Child Monitoring and Safety System Using WSN and IOT Technology:

# This paper presents the design and implementation of a portable IOT-based safety and health monitoring system for children through a sensor embedded health monitoring device for safety and emergency services. It is known that technological advancements are increasing at a faster pace. But the utilization of technologies in various sectors is very low. We know that people of different age groups face different difficulties. But the security for children is very low. There are a lot of cases registered regarding child safety. Nowadays, the schools and the parents are very much worried about their school children for school transport and other places. So, the safety and monitoring of school children is very much difficult. In this project we are introducing the IOT based embedded system used in this project. So we propose a system to continuously monitor the parameters of the child and also their location for safety purposes. The system provides smart child tracking.

# [4] FITSUM TESFAYE:IOT BASED CHILDREN MONITORING SYSTEM:

# Human beings are going to connect to each other by using mobile networks. This paper proposes an SMS based solution to reduce parents' insecurity and schools to track children in real time. Different devices are connected with a single device through. The concerned device is connected to mobile via SMS. The device can be used by stockholders to track children and get real time data. The main Advantage of the proposed system is to send location by using a mobile network (GSM). Here a prototype model (device) is created which is hardware based. The work comprises ARDUINO UNO as microcontroller, along with GPS and GSM module. This device will also have the facility of different status of children by measuring the speed of hand movement of children.

# III. PROS

# Safety is ensured in every place and it can be monitored from anywhere. Easy to use, weightless, compatible and low in cost.

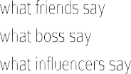
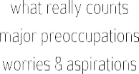
# IV. CONS

# Parents cannot be able to trace if the band is missed and hard to track the children. If the parent is too far from the location they cannot able to monitor and save the child.

# IDEATION & PROPOSED SOLUTION

* 1. Empathy Map Canvas

Build empathy and keep your focus on the user by putting yourself in their shoes.



User Friendly

Peripheral

As it is devices tend to

digitalized, there be more

maybe issues expensive than

caused at times conventional ones.

Cost, not as competitively priced for smaller application

Monitor the activities of the child

under any undesirable circumstances,the exact location of the child can be predicted

lower service cost incase if any defect occurs in the device

Security first at any cost

Convenient to use

Quick response

Easy supervision

Flexibility in creating safe zone

Minimised cost

Alerts parents through sms when child is out of safe zone

Online notifications

Provides exact location of the child

Ensures safety of children

Regular monitoring

* 1. Ideation & Brainstorming



* 1. Proposed Solution

Taking the safety of the child into consideration, the child is provided with a device which helps to monitor the location of the child.

|  |  |  |
| --- | --- | --- |
| **S.No.** | **Parameter** | **Description** |
| 1 | Problem statement (problem to be solved) | The parent/guardian needs to ensure the safety of their children  by receiving notifications about the location of the child so that they can regularly monitor the child’s activity. |
| 2 | Idea / Solution description | A safety gadget to regularly monitor the child’s activity. By creating a Geo-fence, location of the child in safety zone could be seen by the parents. With the help of various sensors, temperature, heart-rate, etc. of the child can also be monitored. |
| 3 | Novelty / Uniqueness | Instead of using wifi and Bluetooth, SMS and E-mail is used to share the details of the child. Also various sensors are also used. |
| 4 | Social Impact / Customer Satisfaction | * Children could be regularly monitored. * Information is sent to parents via both SMS and E-mail so connectivity will not be a barrier. |
| 5 | Business Model (financial Benefit) | Data from the device might be very useful for business involving analysis and detection. |
| 6 | Scalability of Solution | As the device has GPS tracker, geo-fence can be created over a wide range. |

* 1. Problem Solution fit

Offline

While in offline the child's location, heart rate and other data are sent via sms.

**8. CHANNELS OF BEHAVIOUR**

Online

By connecting to the cloud, the child's location is notified to the parents.

**10. YOUR SOLUTION**

Creating a geo fence so that notification would be sent to the parents once the limit is crossed.It tracks the child's location and send it to the parents

1. **TRIGGERS**

Usage of audio & video to ensure the safety of the child triggers the customer (parents) to use this wearable device.

1. **EMOTIONS**

Before: As the parents in this generation are mostly about to go for work, they feel like they have a lack of concentration on their child. After: Parents shall be relaxed and might concentrate on their work as they have a regular track on their child.

**7. BEHAVIOUR**

The gadget helps in improving parent- child interaction when they are not together and helps in regularly monitoring the child's activity and ensures safety.

**9. PROBLEM ROOT/CAUSE**

The problem arises as the children are so playful that they couldn't stay in a place for long time & the tight schedule of the parents make it difficult for them to take care of the child.

**2. PROBLEMS**

Parents need to monitor the child's activity and keep a track on their location by ensuring whether the child stays within the geo-fence created.

**5. AVAILABLE SOLUTIONS**

Merits: The child’s exact location can be tracked and notification is sent to parents via sms and e-mail.

Demerits: Needs proper network connection. Costlier to implement.

**6. CUSTOMER CONSTRAINTS**

The parents should have a smart phone with internet connectivity.

The device must be safe and secure.

**1. CUSTOMER SEGMENT(S)**

Here the customers are the parents and the child's guardian. They shall be able to track and monitor the child regularly.

# REQUIREMENT ANALYSIS

* 1. Functional requirements:

# Project Design Phase-II

**Solution Requirements (Functional & Non-functional)**

|  |  |
| --- | --- |
| Date | 15 October 2022 |
| Team ID | PNT2022TMID06920 |
| Project Name | IOT Based Safety Gadget for Child Safety Monitoring and Notification |
| Maximum Marks | 4 Marks |

# Functional Requirements:

Following are the functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **FR**  **No.** | **Functional**  **Requirement (Epic)** | **Sub Requirement (Story / Sub-Task)** |
| FR  -1 | User visibility | Emergency alerts via Fast SMS and through internet |
| FR  -2 | User reception | Notifications will be sent to their parents if their child crosses the geofence and also the location of  a child is stored in the database |
| FR  -3 | User Understanding | Based on the values collected by the device, The user will understand that if they receive any SMS, then their child is in danger. |
| FR  -4 | User action | If anything happens to the child, parent needs to take appropriate measures to help and make their feel children safe as soon as the alert received. |

# Non-functional Requirements:

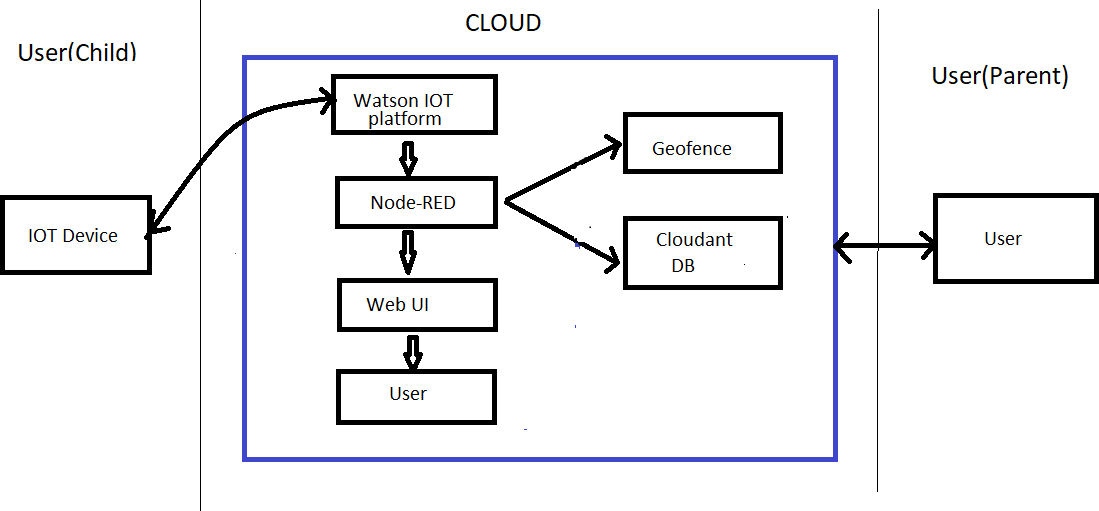
Following are the non-functional requirements of the proposed solution.

|  |  |  |
| --- | --- | --- |
| **FR**  **No.** | **Non-Functional Requirement** | **Description** |
| NFR  -1 | **Usability** | It be required to preclude children before being harmed, an autonomous real-time monitoring system is necessary for every  child away from their parents. |
| NFR  -2 | **Security** | It be supposed to be designed to wearable without any problems. It would be worn by  the children all the time and it should give assurance that it works all the time. |
| NFR  -3 | **Reliability** | It should be actively being monitor the child and should send information to the parents all the time. It must recognize the danger caused to the child immediately. |
| NFR  -4 | **Performance** | Notification will be sent to the parents if the child across the geofence. |

|  |  |  |
| --- | --- | --- |
| NFR  -5 | **Availability** | It must be active for all day and remain active at least a week for a single charge. So, it would be useful for the parents |
| NFR  -6 | **Scalability** | This device ought to have the option to effortlessly change overhaul concurring to change and need in requirements. |

# PROJECT DESIGN

* 1. Data Flow Diagrams



* 1. Solution & Technical Architecture

Project Design Phase-II Technology Stack (Architecture & Stack)

|  |  |
| --- | --- |
| Date | 15 October 2022 |
| Team ID | PNT2022TMID06920 |
| Project Name | Project - IOT Based Safety Gadget for Child Safety Monitoring and Notification. |
| Maximum Marks | 4 Marks |

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

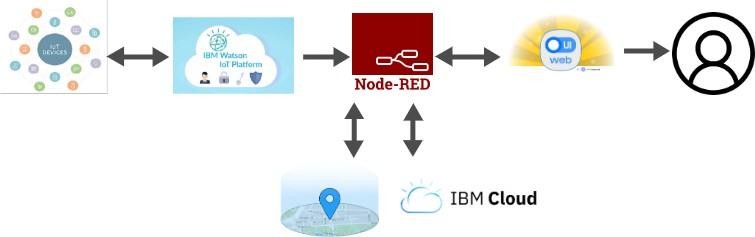


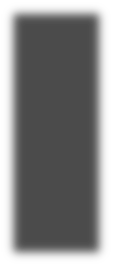
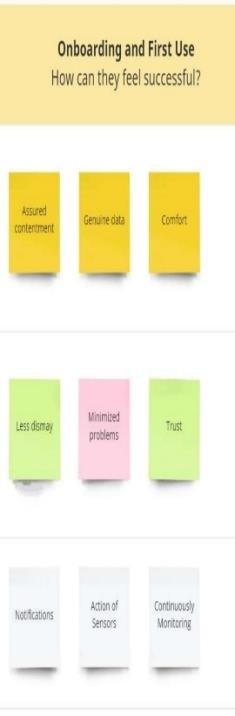
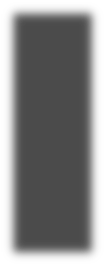
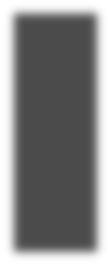
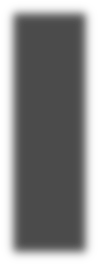
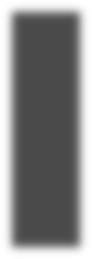
Table-1 : Components & Technologies:

|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Component** | **Description** | **Technology** |
| 1. | User Interface | How the user interacts with the application . Web UI | App development |
| 2. | Application Logic | Logic for a process in the application | Python |
| 3. | Database | Data Type, Configurations etc. | Cloud database |
| 4. | Cloud Database | Database Service on Cloud | IBM Cloudant . |
| 5. | File Storage | File storage requirements | IBM Block Storage or Other Storage Service or Local File system |
| 6. | Cloud/Server | 1. Cloud server description 2. Local server description | Cloud foundry |
| 7. | Protocol | How data exchange on web | HTTP |

Table-2: Application Characteristics:

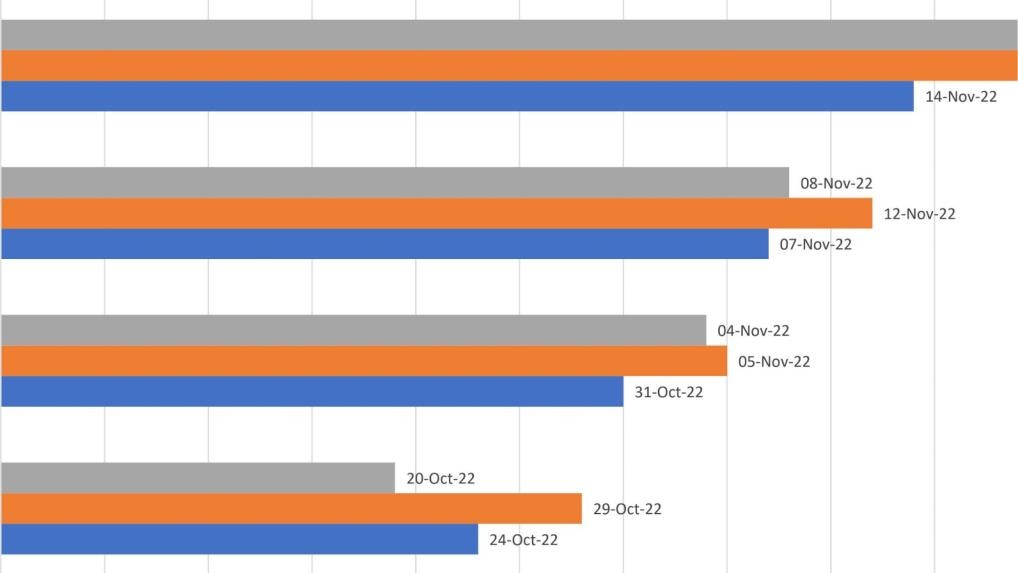
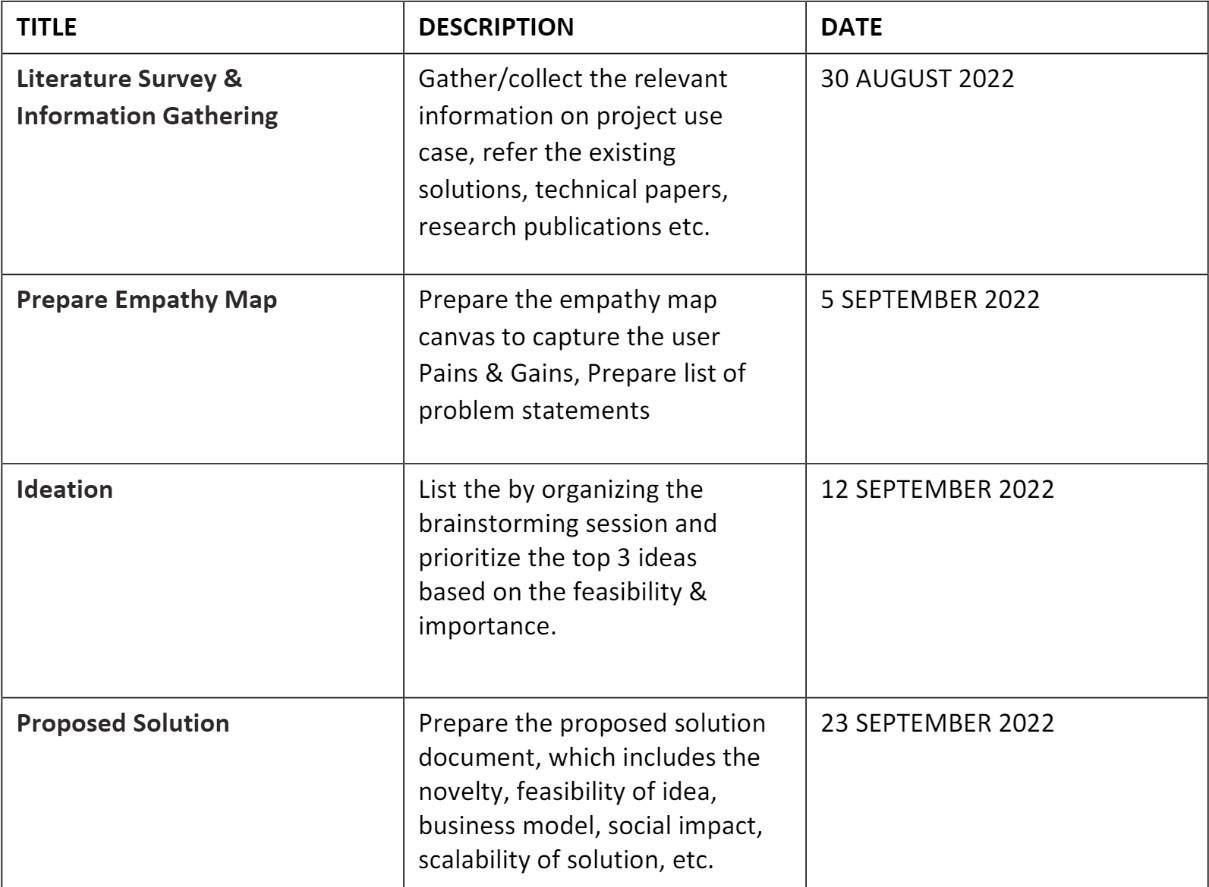
|  |  |  |  |
| --- | --- | --- | --- |
| **S.No** | **Characteristics** | **Description** | **Technology** |
| 1. | Security Implementations | List all the security / access controls implemented, use of firewalls etc. | We are using the IBM cloud, so for every instance of time it updates the  current location of the children to their parents/caretakers. |
| 2. | Scalable Architecture | Justify the scalability of architecture (3 – tier, Micro-services) | The technology is used to monitor and send alert notification. |
| 3. | Availability | Justify the availability of applications (e.g. use of load balancers, distributed servers etc.) | We are using the geofence, a service  that triggers an action when a device enters a set location |
| 4. | Performance | Design consideration for the performance of the application | We are using HTTP, for every second the location of the children are sent to  the parents. |

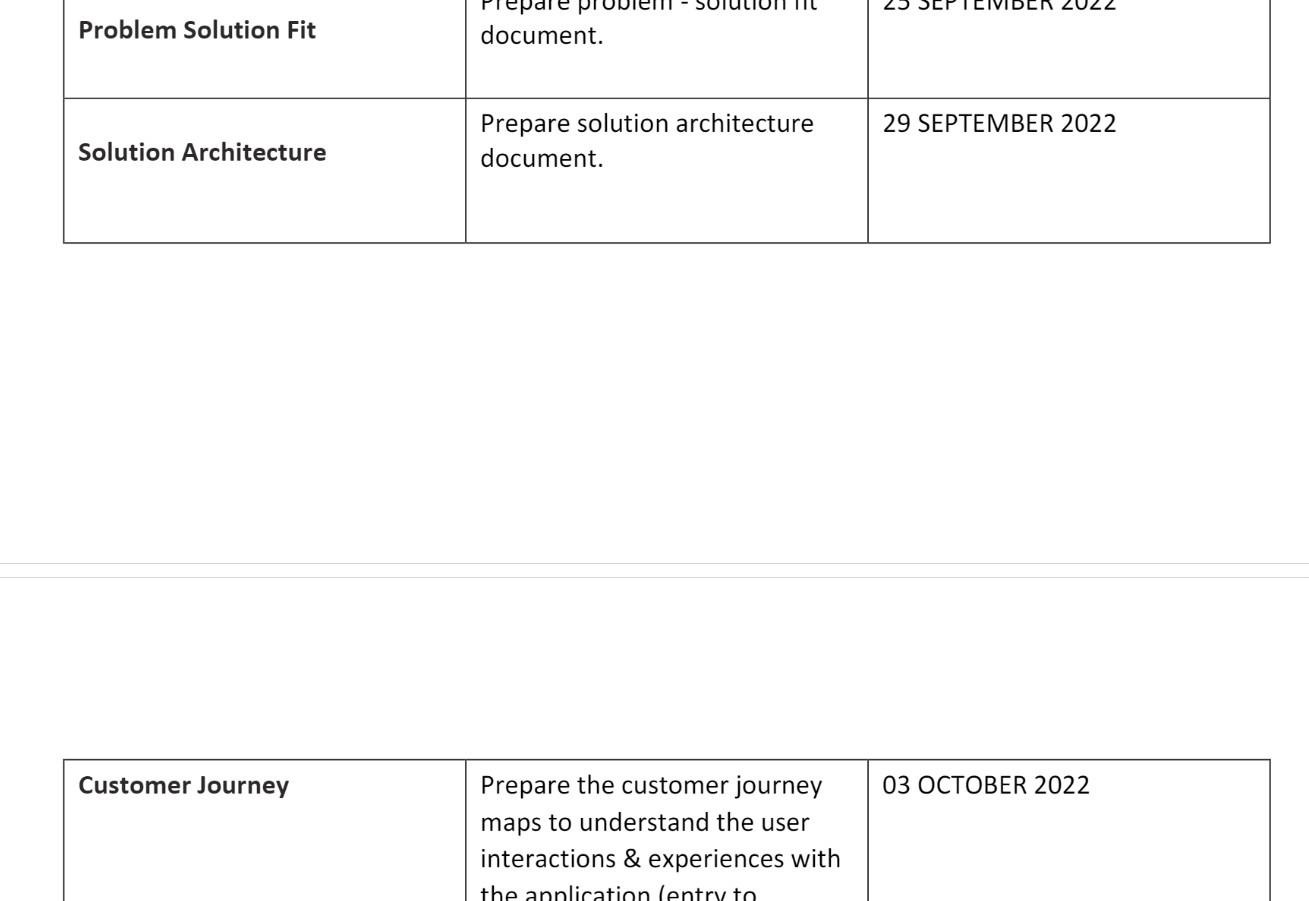
CUSTOMER JOURNEY

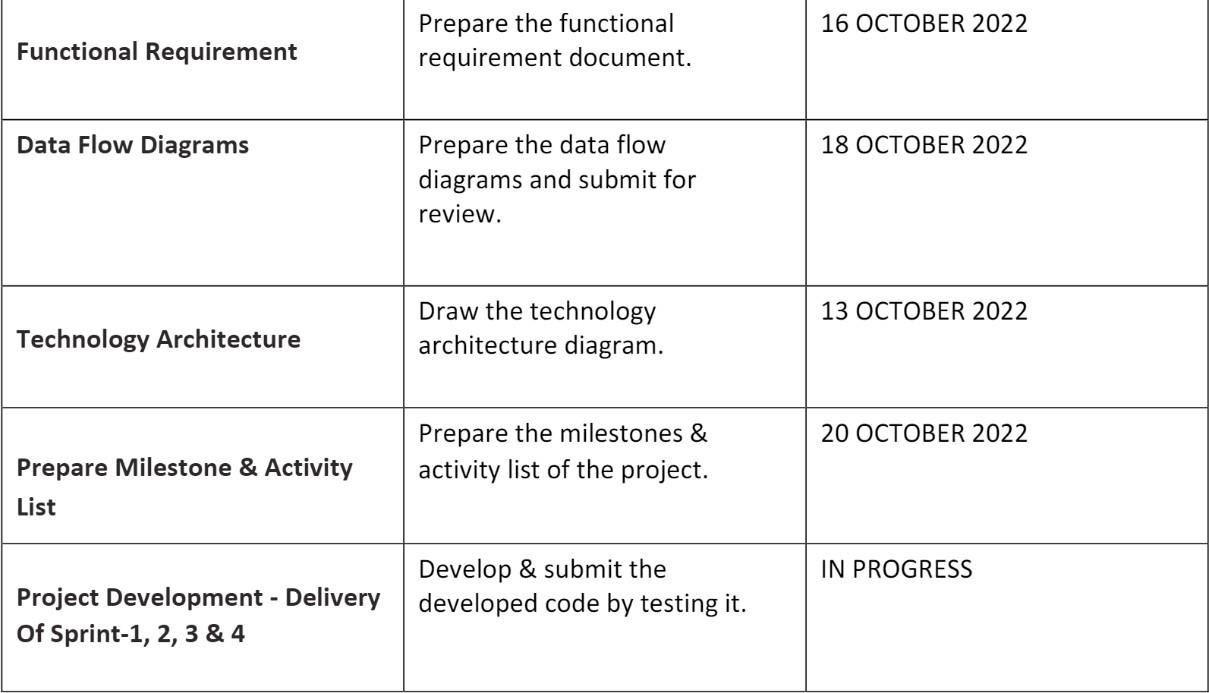


# PROJECT PLANNING & SCHEDULING

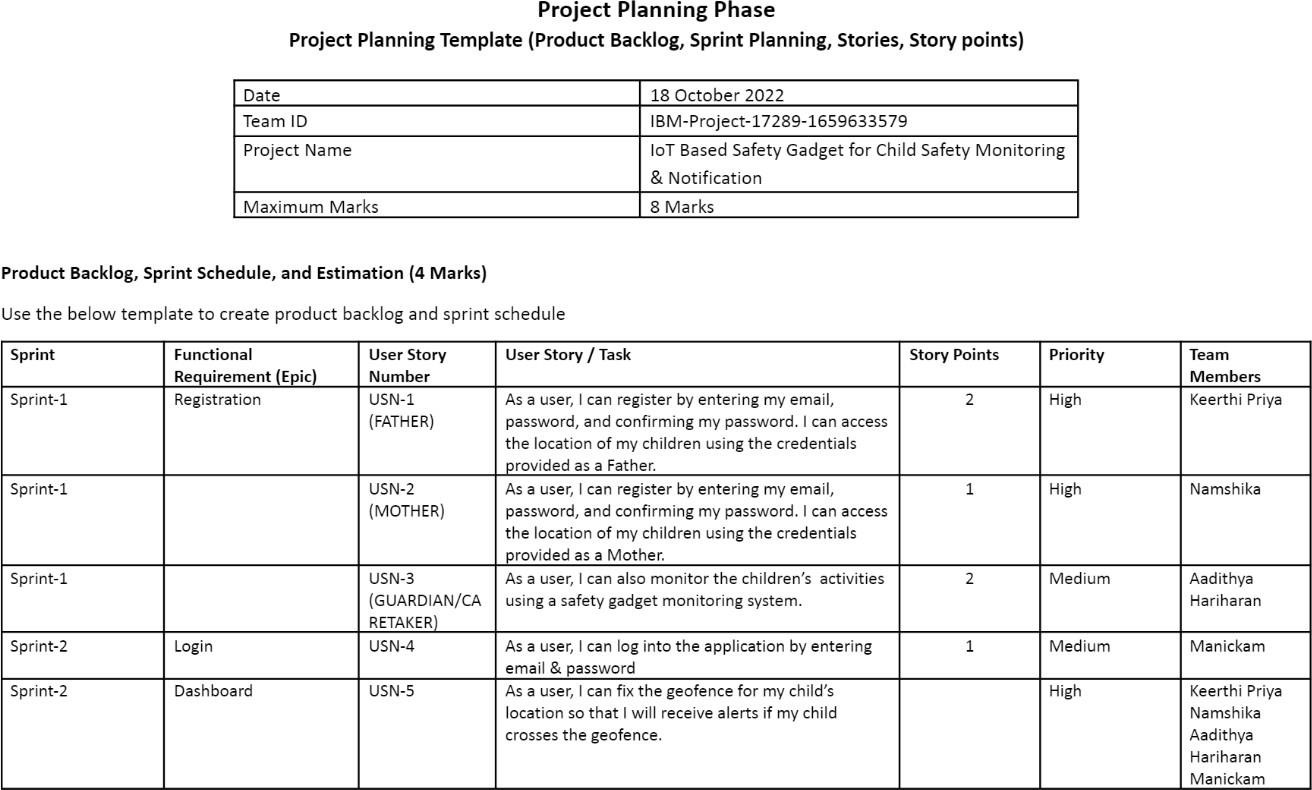
* 1. Sprint Planning & Estimation







# Sprint Delivery Schedule



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

# Feature 1

* + 1. It is a website application.

# Feature 2

* + 1. Using an account, a parent can create multiple accounts for their multiple children.

1. **RESULT**

# Performance Metrics

**Fast updation of child’s location**

* User Friendly interface
* Low data involvement

# ADVANTAGES & DISADVANTAGES

* 1. **Advantages**
     1. A parent can access the child's location 24x7.
     2. It provides real time detection.
     3. Parent receives instant notification when the child crosses the geofence.
     4. Easy to use interface.
     5. A parent can create as many as nodes for multiple children.

# Disadvantages

* + 1. Our application cannot be used without internet connection.
    2. To access the child’s location the parent has to access the web application.

# CONCLUSION

* 1. A parent can access their child’s location in a realtime way.The child tracker frequently updates the location of the child.Any parent can make use of this application to track their child after establishing a geofence around their child.Hence, this application serves as a platform that can be used to monitor a child and ensure safety of the child .

# FUTURE SCOPE

* 1. The application can be made an offline application in order for people to access their child’s location in the absence of internet connection.
  2. The application is currently a web based application. It has scope to be made into a hybrid application by making it into a native application.

1. **GitHub Link:-**

https://github.com/IBM-EPBL/IBM-Project-7204-1658849985