IoT Based Safety Gadget for Child Safety Monitoring And Notification:

Batch : B1-1M3E

Team ID :PNT2022TMID25450

Team Leader: MIRDHULA M

Team Members: MALARVIZHI M, NIRANJANI R, BATHMA S

CONTENTS:-

1.INTRODUCTION:-

1.1.PROJECT OVERVIEW:-

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 particular location. By continuously checking the child's location notifications will be generated 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.

1.2.PURPOSE:

The novelty of the work is that the system automatically alerts the parents/caretaker by sending SMS, when immediate attention is required for the child during emergency

2.LITERATURE SURVEY:-

2.1.EXISTING PROBLEM:

Nowadays, there are many projects for child safety Monitoring only .But we exploit the IoT device for monitoring the location and also parents can

create the geofence they wish ,the SMS is sent to the parents if the child crosses the geofence.

2.2.REFERENCES

[1] N.Senthamilarasi, N.Dhivya bharathi, D. Ezhilarasi and R.B.Sangavi:-Child Safety Monitoring System Based on IOT- NOV 2019 [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 [3]P. Poonkuzhali1 , R.Aarthi 2 ,Yazhini.V.M3 , Yuvashree.S4 , Vidhyalakshmi .G:-Child Monitoring and Safety System Using WSN and IOT Technology

2.3.PROBLEM STATEMENT AND DEFINITION:-

The overall percentage of child abuse cases filed recently in the world is about 80%, out of which 74 percent 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.

DEFINITION:-

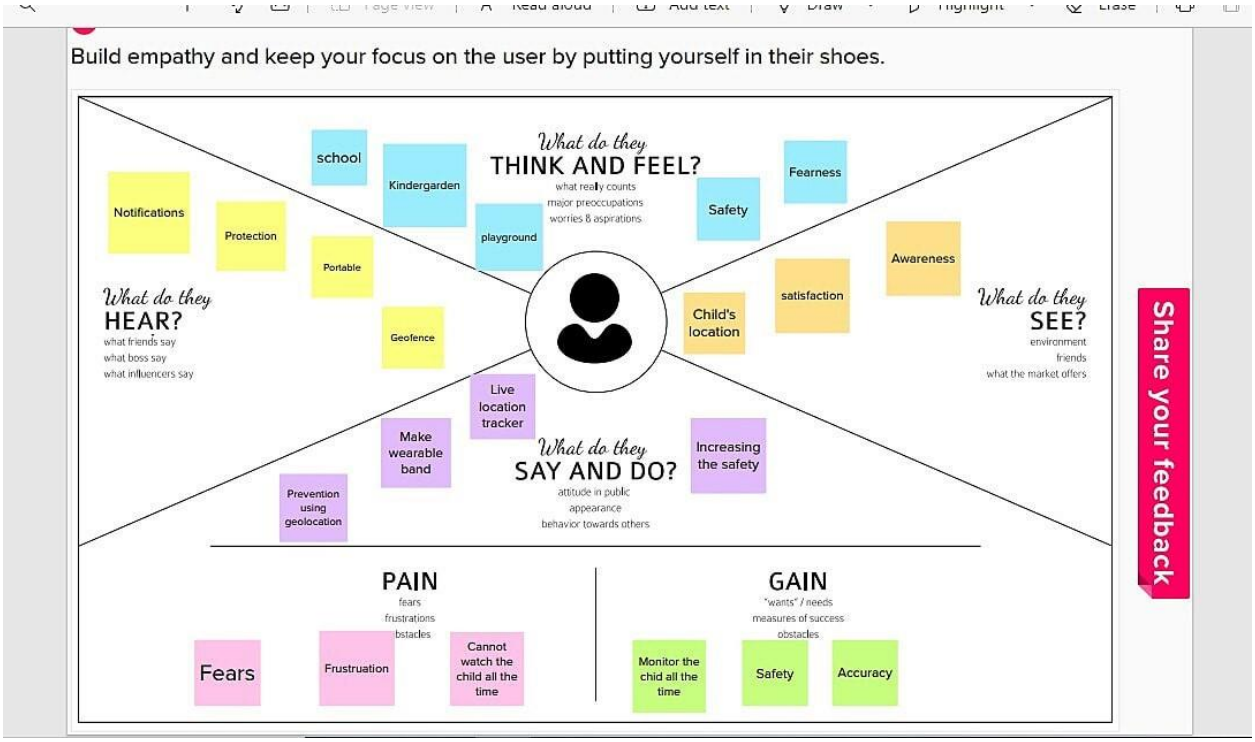
Child tracker helps the parents in continuously monitoring the child's location. They can simply leave their children in school or parks and create a geofence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geofence.

- 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.
- If the child is in danger then it will send the alert or notification to their parents or caretakers.
- The alert can be sent to all the people who are updated in the process.
- If the device is missed somewhere then we can trace the location and rescue the device.

3.IDEATION AND PROPOSED SOLUTION:-

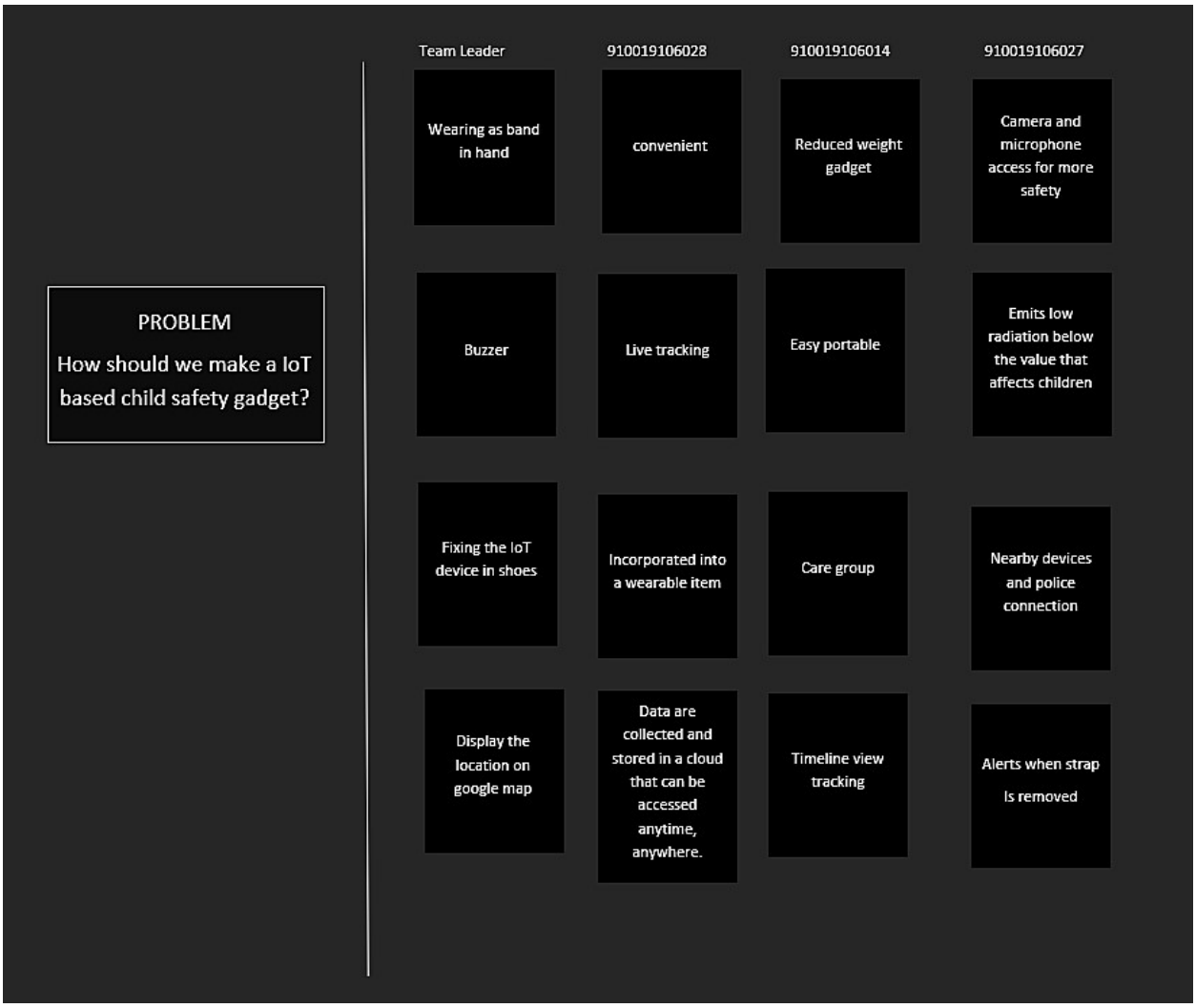
3.1.EMPATHY MAP CANVAS:-

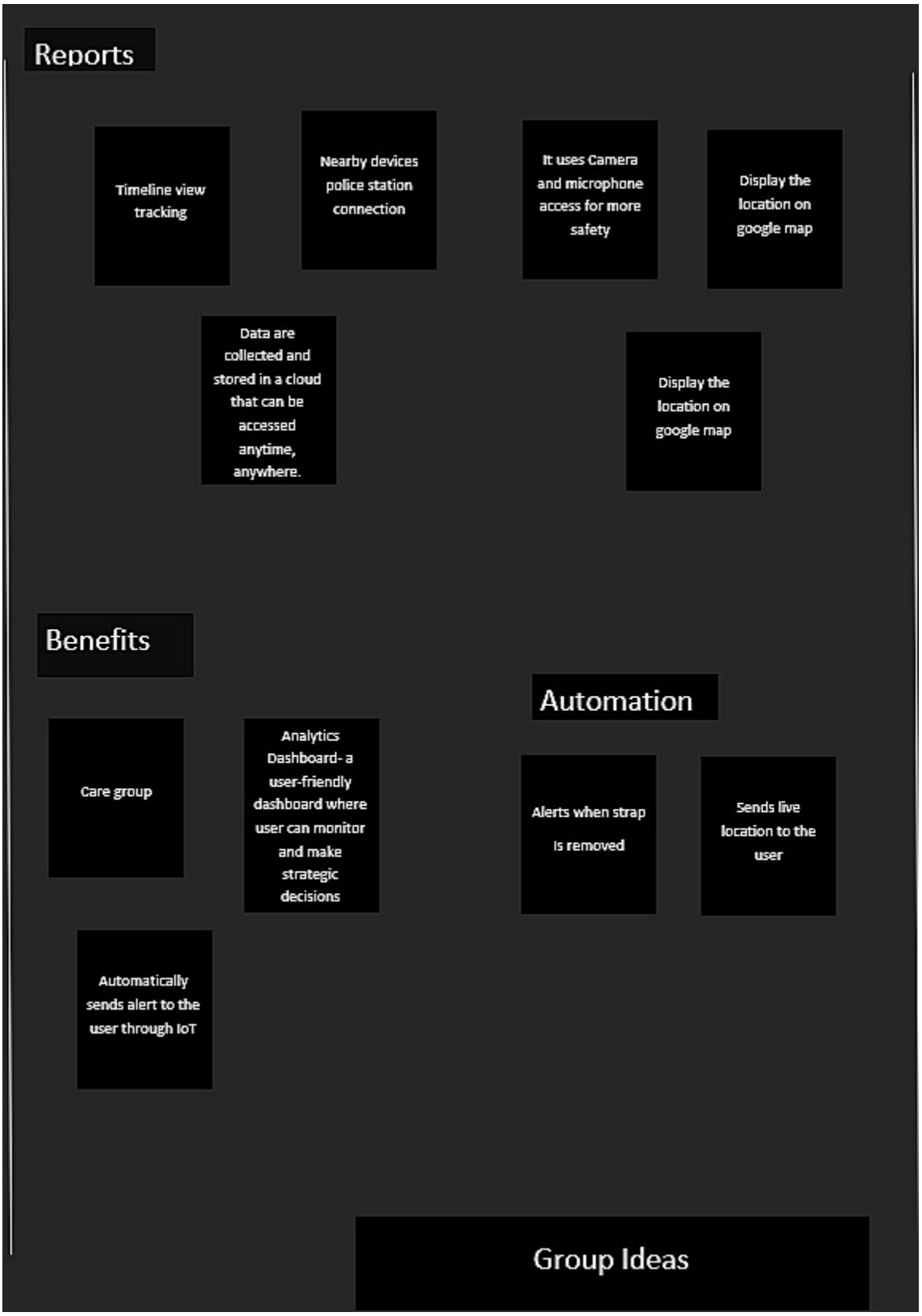
Empathy map is to bridge the understanding of end user



3.2.IDEATION & BRAINSTORMING :-

Ideation is a specific technique that is utilized to generate new ideas.Ideation is most commonly more thought of as being an individual pursuit,while brainstorming is almost always a group activity.

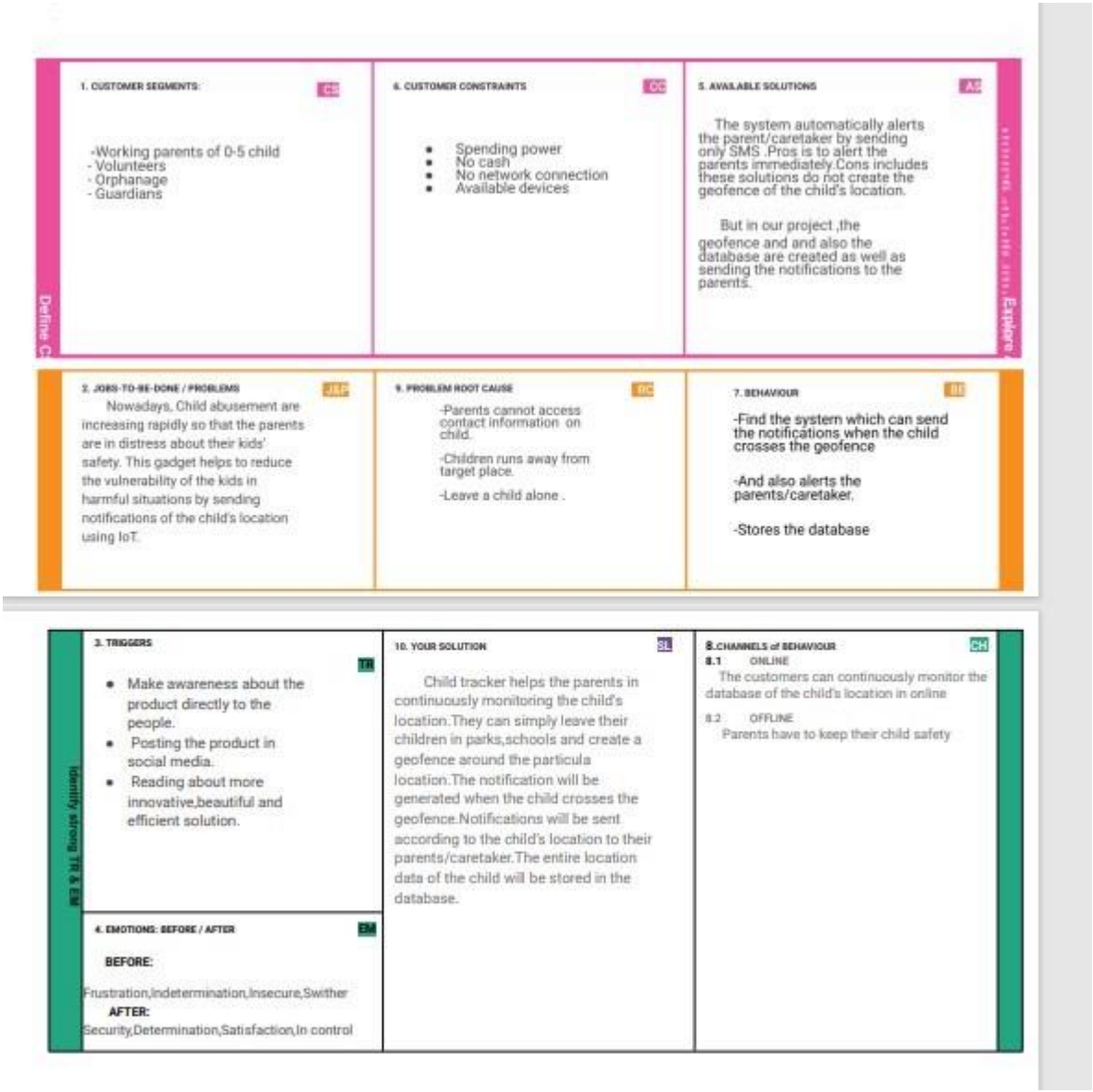

PROBLEM
How should we make a IoT based child safety gadget?
Team Leader
910019106028
910019106014
910019106027
Wearing as band in hand
convenient
Reduced weight gadget
Camera and microphone access for more safety
Buzzer
Live tracking
Easy portable
Emits low radiation below the value that affects children
Fixing the IoT device in shoes
Incorporated into a wearable item
Care group
Nearby devices and police connection
Display the location on google map
Data are collected and stored in a cloud that can be accessed anytime, anywhere.
Timeline view tracking
Alerts when strap Is removed


Reports
Timeline view tracking
Nearby devices police station connection
It uses Camera and microphone access for more safety
Display the location on google map
Data are collected and stored in a cloud that can be accessed anytime, anywhere.
Display the location on google map
Benefits
Automation
Care group
Analytics Dashboard- a user-friendly dashboard where user can monitor and make strategic decisions
Alerts when strap is removed
Sends live location to the user
Automatically sends alert to the user through IoT
Group Ideas

3.3.PROPOSED SOLUTION:

1	Problem Statement (Problem to be solved)	Nowadays,parents concern more about serious cases such as missing children,abduction and abuse. They cannot sit with their children or 24*7 hours to secure their children and monitor the children's activities
2	Idea / Solution description	Create a Child tracker which helps the parents in continuously monitoring the child's location. The notification will be sent according to the child's location to their parents or caretakers. The entire location data will be stored in the database.
3	Novelty / Uniqueness	The novelty of the work is that the system automatically alerts the parent/caretaker by sending notification,when immediate attention is required for the child during emergency
4	Social Impact / Customer Satisfaction	The parents may get the notification about whether the child reached the school or not
5	Business Model (Revenue Model)	● Easy to use ● Low cost ● Weightless ● Compatible
6	Scalability of the Solution	● Gadget ensures the safety and tracking of the children ● Parents need not worry about their children

3.4.PROPOSED SOLUTION FIT:-



4.FUNCTIONAL REQUIREMENTS:-

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)

FR1	User visibility	Emergency alerts via Fast SMS and through internet
FR2	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
FR3	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.
FR4	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:-

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 weared 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 crosses the geofence.

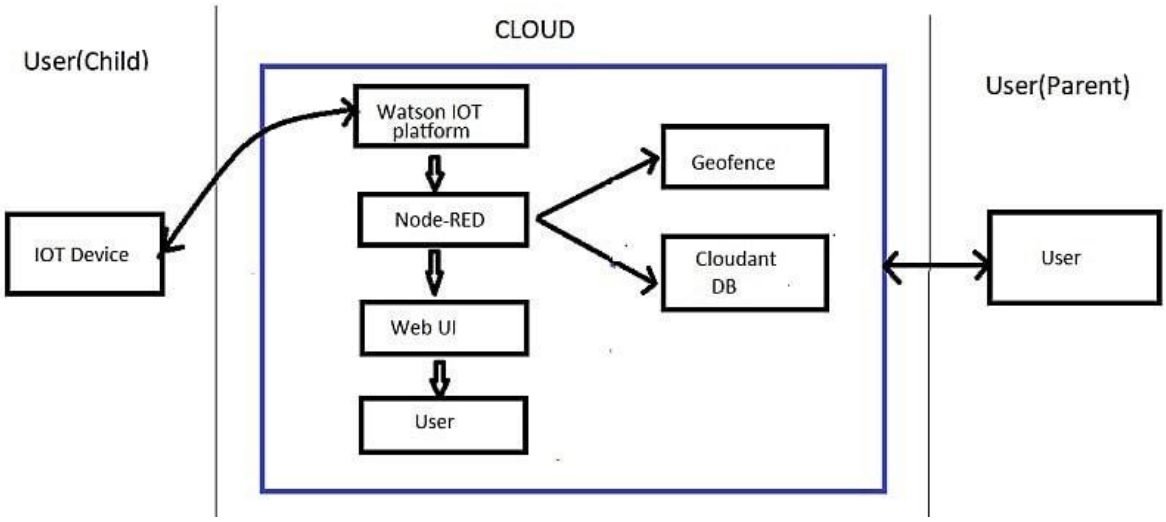
NFR-5	Availability	It must be active for all day and remain active at least a week for a single charge. So, it would be useful for the parents NFR6 Scalability This device ought to have the option to effortlessly change overhaul concurring to change and need in requirements
NFR-6	Scalability	This device ought to have the option to effortlessly change overhaul concurring to change and need in requirements

5.PROJECT DESIGN:-

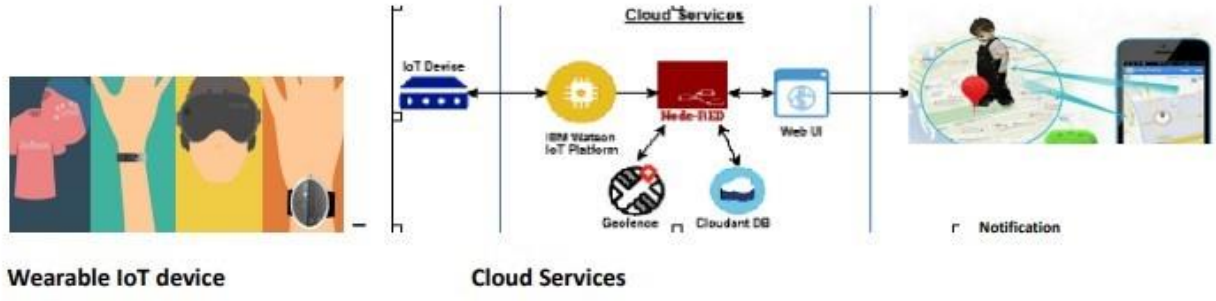
5.1.Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored

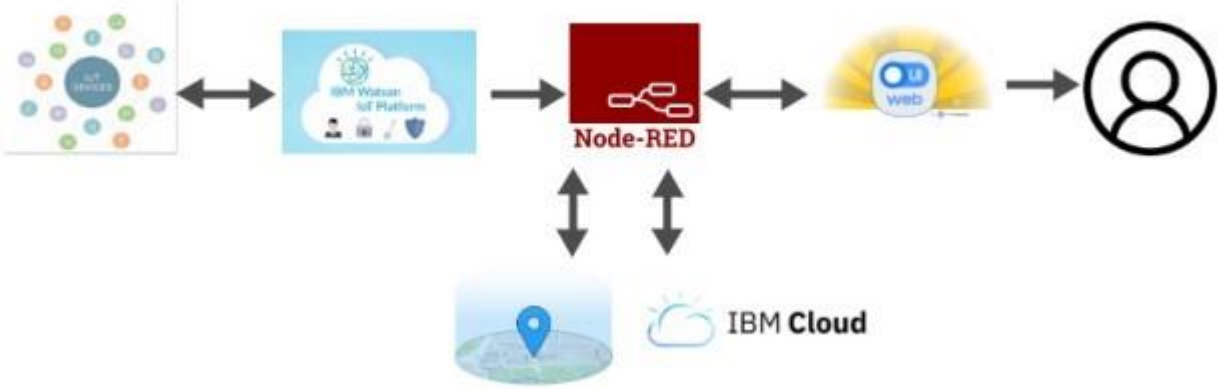
FLOW:-



5.2.Solution&Technical Architecture:-



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 (Web user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application	I can receive confirmation email and click confirm	High	Sprint-1

		USN-3	As a user,I can register for the application through Facebook	I can register and access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail		Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email and password		High	Sprint-1
	Dashboard	USN-6	As a User, I can view the Dashboard	I can view the locations which is stored in the database of the child	High	Sprint-2
				via dashboard		
Customer Care Executive		USN-7	As a customer care executive,I will detect the problems	I will detect the problems and correct them if the device face any	Medium	Sprint-3
Administrator		USN-8	As an administrator, I ensure the efficiency of the device	I will ensure efficiency,cost,e tc	High	Sprint-4

6.PROJECT PLANNING AND SCHEDULING:-

6.1.Sprint Planning and Estimation:

Product backlog and sprint schedule:-

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1		US-1	Create the IBM Cloud services which are being used in this project.	6	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-1		US-2	Configure the IBM Cloud services which are being used in completing this project.	4	Medium	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-1		US-3	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the	5	Medium	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
			IBM Watson IoT platform.			
Sprint-1		US-4	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	5	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-2		US-1	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	10	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-2		US-2	Create a Node-RED service.	10	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D

Sprint-3		US-1	Develop a python script to create the geofence and publish the location of the child to the IBM IoT platform	7	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D

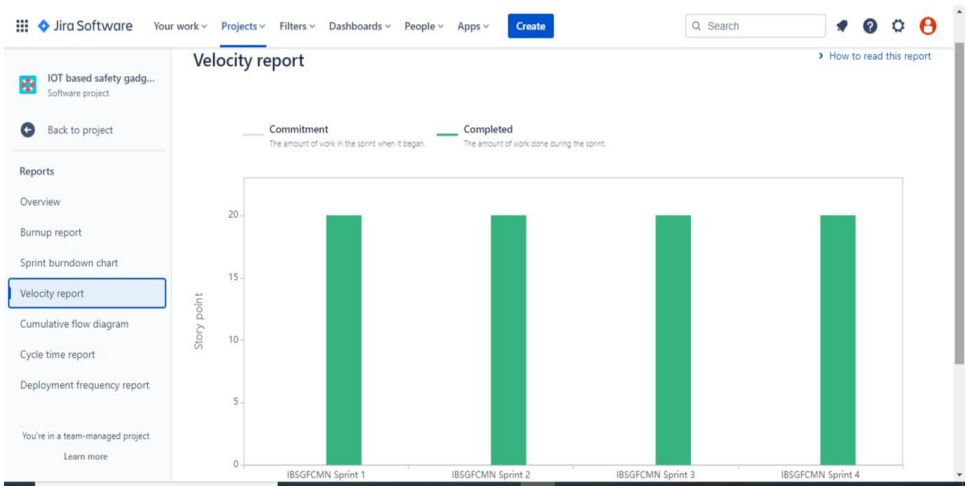
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-3		US-2	After developing python code, commands are received just print the statements which represents the location of the child	5	Medium	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-3		US-3	Publish Data To The IBM Cloud	8	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-4		US-1	Create Web UI in Node-Red	10	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D
Sprint-4		US-2	Configure the Node-RED flow to receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received location data in the cloudant DB	10	High	Nishanthi G,pugazhmathi R,Muthuamy A,Harisurajkumar D

Project Tracker, Velocity & Burndown Chart: (4 Marks)

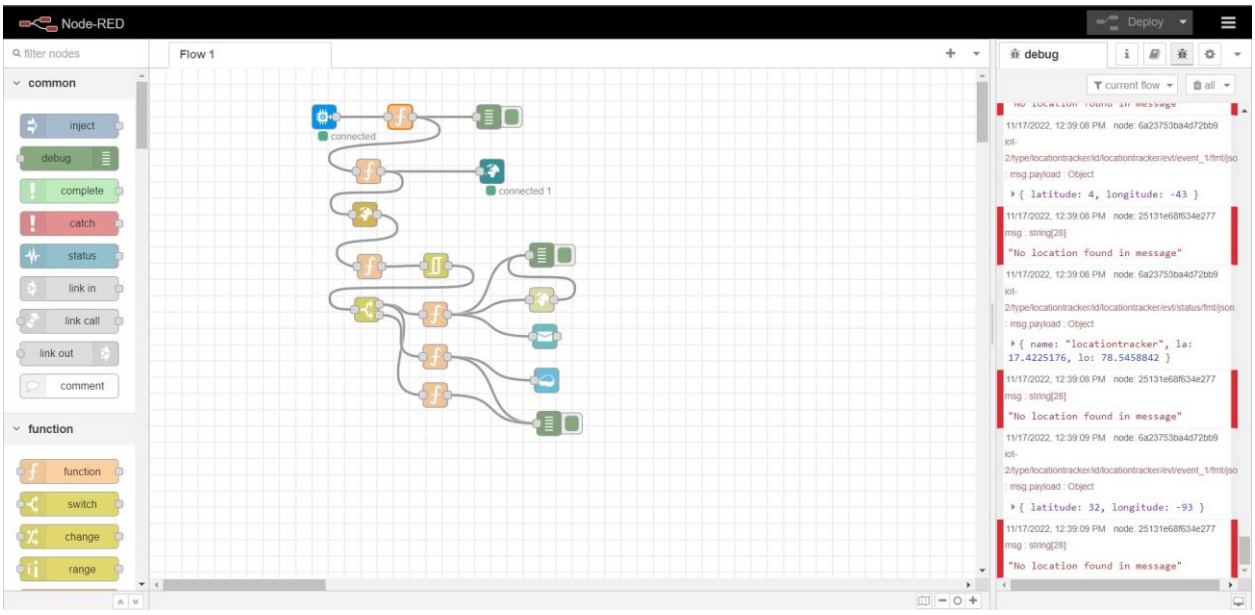
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

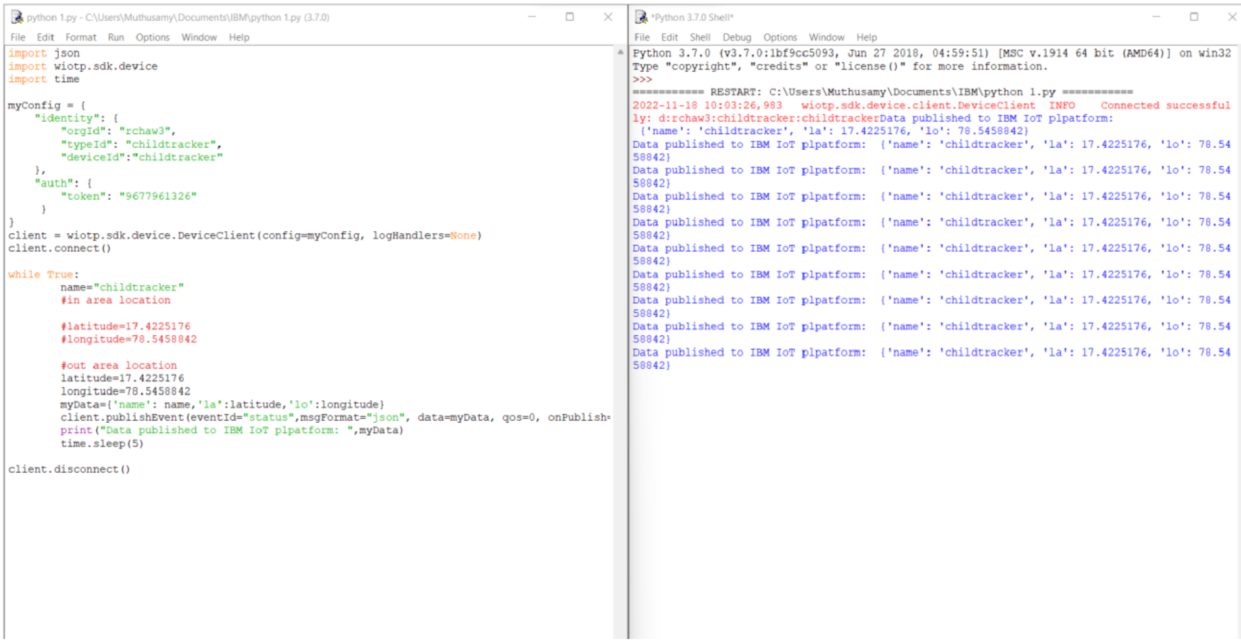
6.3.REPORTS FROM JIRA:-

Jira report



7.CODING & SOLUTIONING:-





8.TESTING:-

a.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	Executed By
TC_OO1	Functional	IBM cloud	Create the IBM Cloud services which are being used in this project.	IBM Cloud Login ID & Password	1.Go to IBM Cloud signup page 2.Enter e-mail id and other credentials 3.Enter a password	https://cloud.ibm.com/login	User should sign up IBM cloud and details should be verified	Working as expected	Pass	Results verified	No		Muthusamy A
TC_OO2	Functional	IBM Cloud	Configure the IBM Cloud services which are being used in completing this project.	IBM Cloud Login ID & Password	1.Go to Cloud login 2.Enter user ID & Password 3.Verify login by the popup display	https://cloud.ibm.com/login	User login to IBM Cloud and should be navigated to IBM Cloud dashboard page	Working as expected	Pass	Results verified	No		Pugazhmathi R Hari suraj kumar D
TC_OO3	Functional	IBM Watson IoT Platform	IBM Watson IoT platform acts as the mediator to connect the web application to IoT devices, so create the IBM Watson IoT platform.	IBM Watson IoT Platform Login ID & Password	1.Login to IBM Cloud 2.Click Catalog 3.Search IoT and click create 4.Go to resource list and search Internet of Things platform 5.Press Launch and click Sign in IBM Watson Platform	https://rchaw3.internetofthings.ibmcloud.com/dashboard/devices/browse	User should be navigated to IBM IoT Watson Platform	Working as expected	Pass	Results verified	No		Pugazhmathi R Hari Suraj Kumar D
TC_OO4	Functional	IBM Watson	In order to connect the IoT device to the IBM cloud, create a device in the IBM Watson IoT platform and get the device credentials.	IBM Watson IoT Platform Login ID & Password	1.Login to IBM Watson Platform 2. Click Add Device 3.Enter the details and click Finish. Create Device ID & Device type 4.Turn on Device Simulator and click simulation running. Enter the values of gas, temperature & humidity level 5.Click Send & Save. Verify the displayed result of the levels	Check the location of the child using Geofence and give notification to the parent	Check the location	Working as expected	Pass	Results verified	No		Nishanthi G
TC_OO5	Functional	IBM Cloud(Node Red)	Configure the connection security and create API keys that are used in the Node-RED service for accessing the IBM IoT Platform.	Node Red Installation	1.Install node red and open node red in command prompt 2.Select IBM input in IoT	https://cloud.ibm.com/developer/appservice/create-app?starterKit=59c9d5bd-4d31-3611-897a-f94eea80dc9f&defaultLanguage=undefine	User should be able to see the Node Red page	Working as expected	Pass	Results verified	No		Pugazhmathi R Hari suraj kumar D

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	Executed By
TC_006	Functional	Node Red	Create a Node-RED service.	Node Red Installation	1.Select IBM IoT input in Node. In IBM IoT Watson Platform, go to apps and click on generate API keys. 2.Copy & paste generated API key and token in the IBM IoT input. After entering all details, click the done button. 3.Add debug to the IBM IoT and rename as Msg.payload and click on done. Click gauge from the dashboard and fill the details & add functions to the gauge. Check the generated values from the debug message. 4.Edit function node, connect them, add another gauge and functions, name them as "Temperature", "Gas" &"Humidity" 5.Finally add alarm ON/OFF and Sprinkler ON/OFF buttons to the IBM IoT and debug. Verify the output from NODE RED using Local host link	Location is checked randomly. Child location is stored in the geofence. Whenever the child exist the location then the notification alert is send to the parent/Care takers.	Location of the child is send to the parent Via SMS	Working as expected	Pass	Results verified	No		Pugazhmathi R Hari suraj kumar D
TC_007	Functional	Python 3.7.0	Develop a python script to publish random sensor data such as temperature, humidity level and Gas level to the IBM IoT platform	Python 3.7.0(64 bit) installation	1.Download and Install Python 3.7.0 2.Develop python code	https://www.python.org/downloads/release/python-370/	User should be able to develop a python code	Working as expected	Pass	Results verified	No		Nishanthi G

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	Executed By
TC_008	Functional	Python 3.7.0	After developing python code, commands are received just print the statements which represent the control of the devices.	Python 3.7.0(64 bit) installation	1.Downlinstall Python 3.7.0 2.After python code	Get the output from the code	User should be able to get the results from the developed code	Working as expected	Pass	Results verified	No		Nishanthi G
TC_009	Functional	M Cloudant D	Publish Data to The IBM Cloud	IBM Cloud Login ID & Password	1.Run the python code 2.Verify the displayed output	Publishment of python code	User should be able to publish the co	Working as expected	Pass	Results verified	No		Nishanthi G Pugazhmathi R
TC_010	Web UI	Node Red & MIT Inventor	Create Web UI in Node Red	MIT Inventor Login ID & password	1.Go to Node Red. Select http in & http response. Add functions and select another http in and http response. Connect them to IBM IoT output and function.Print the command statements such as Sprinkler ON/OFF, Alarm ON/OFF and sensor 2.Go to MIT app inventor and create frontend using buttons,horizontal arrangement, text bar, etc. Add blocks and so on to create back end. Verify the output	In the safety gadget the location Notification is send through the SMS to the parent	Location should be seen in the mobile application	Working as expected	Pass	Results verified	No		Muthusamy A Hari Suraj Kumar D
TC_011	Functional	IBM Cloudant DB	Configure the Node RED flow to receive data from the IBM IoT platform and also use Cloudant DB nodes to store the received sensor data in the cloudant DB	IBM Cloud Login ID & Password	1.Go to IBM cloud, search Cloudant in Catalog. Add new dashboard, go to Node Red 2.Connect to cloudant and verify the results	Cloudant is connected by NODE RED	User should be able to connect the Cloudant and Node Red	Working as expected	Pass	Results verified	No		Pugazhmathi R Hari suraj kumar D

b.Acceptance Testing:-

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [IOT based safety gadget for child safety monitoring and notification] project at the time of the release to User Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	8	1	2	3	14
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	9	2	4	10	25
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	20	11	13	16	60

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

9.RESULTS:-

a.Performance Metrics:

S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Load/Volume Changes	Risk Score
1	Notification on /off	New	Moderate	No Changes	Moderate	>50 to 70%	ORANGE
2	Fast SMS	New	Moderate	No Changes	Moderate	>10 to 30%	ORANGE
3	Node red	Existing	Low	No Changes	Low	>5 to 10%	GREEN
4	Cloudant database	New	Moderate	No Changes	Moderate	>10 to 30%	ORANGE

NFT - Detailed Test Plan

S.No	Project Overview	NFT Test approach	Approvals/SignOff	
1	Python script	Python coding	https://www.python.org/psf/sponsors/#heroku	Depend on the delivered code
2	Node Red	Geofence and World map	https://nodered.org/	Latitude and longitude
3	MIT Inventor	Location/ Notification	https://appinventor.mit.edu/about/termsofservice	Notifications

End Of Test Report

S.No	Project Overview	NFT Test approach	NFR - Met	Test Outcome	GO/NO-GO decision	Identified Defects (Detected/Closed/Open)	Recommendations
1	Python Code	Python coding	Met	Pass	GO	Closed	Efficient code
2	Node Red	Geofence and World map	Met	Pass	GO	Closed	Checking the location and gives ale
3	MIT Inventor	Location and notification	Met	Pass	GO	Closed	Alert the parent when the child exi

10.ADVANTAGES:-

1.It assists parents to continuously monitoring their children remotely.

2.In case situations happen,notifications will be sent to parents so that actions can be taken.

3.Child safety can be ensured .

4.Crime rate will be reduced.

DISADVANTAGES:-

1.Wearable devices which are used to locate the children only through Wi-fi and Bluetooth.

2. It causes health issues.

11.CONCLUSION:-

Nowadays,the security for the children is very low. There are a substantial amount of cases registered regarding child safety. In recent times, 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 monitor the parameters of the child continuously and also their location for safety purposes. So , this device uses smart child tracking.

12.FUTURE SCOPE:-

The Smart IoT device for child safety and tracking helping the parents to locate and monitor their children. If any abnormal values are read,then an SMS is sent to the parents mobile and an MMS

indicating an image captured by the serial camera is also sent. The future scope of the work is to implement the IoT device which ensures the complete solution for child safety problems.

13.APPENDIX:-

Source Code:-

```
import json import
wiotp.sdk.device import time

myConfig = {
   "identity": {
      "orgId": "rchaw3",
      "typeId": "locationtracker",
      "deviceId":"locationtracker"
   },
   "auth": {
      "token": "rW@X48h+v(PA8XnMZM"
    }
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None) client.connect()

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

      #latitude=17.4225176
      #longitude=78.5458842

      #out area location
      latitude=17.4225176
      longitude=78.5458842
      myData={'name': name,'la':latitude,'lo':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()
```

GITHUB LINK:-

- https://github.com/IBM-EPBL/IBM-Project-52139-1660989828

DEMO LINK:-

https://drive.google.com/file/d/1k3DJGMeP9gQQwq1oQiTy5IEJgtsBeJ8R/view?usp=drivesdk