

IoT based Safety Gadget for Child Safety Monitoring & Notification

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CHAPTER - 1

INTRODUCTION

Basically, children cannot complain about abusements which they face in their daily life to their parents. They can't even realize what actually happens to them at their age. It is also difficult for parents to identify their children are being abused. Since to prevent children before being attacked, an autonomous real-time monitoring system is necessary for every child out there. In this system, the collected values from every sensor like temperature sensor, pulse rate detection sensor, metal detection sensor, and the location value from GPS are used to detect the status of the child and alerts the respective guardians using GSM accordingly.

1.1. Project Overview

Child safety is a challenging problem nowadays due to antisocial elements in the society. The crime rate is day by day increasing. Schools and working places need high surveillance for ensuring the safety among children. Smart phones are playing major role for ensuring the safety, where some mobile based applications provide alert systems. During the emergency, mobile apps alert the control room of nearby police station or caretakers of children. The literature shows that location tracking devices are available in the market, but it does not provide the complete solution to the problem. The solution to this problem is to design an IoT device, which senses the child's location and environment and during emergency, it should send the alert to the parents automatically.

1. 2. Purpose

This Child Monitoring system helps monitor or track the child and their activities from anywhere in the world. This system plays an important role. It tracks whether the children are safe. Some prominent features of this system are Geo-fencing, Discrete Panic Button, Long battery life, Real-Time Tracking. The most important reason for monitoring each child's development is to determine whether a child's development is on track. Looking for developmental milestones is important to understanding each child's development and behavior. Milestones can help explain a child's behavior.

CHAPTER - 2

LITERATURE SURVEY

2.1. Existing Problem

Real-Time Child Abuse and Reporting System In the existing system, we use a voice recognition module in which the alert commands from the child are stored and kept for further reference. If the same child delivers the same command, it will compare with the alert command which was previously stored and sets an emergency level according to the alert command. The GSM has a SIM which is used to send an alert message or an alert call to the trusted peoples. The server will search the respective device ID from the database and search for respective contacts according to that device ID and helps in alerting the registered guardians. The disadvantage of this project are,

- i. The child could not produce the exact alert command during a panic condition.
- ii. The command produced maynot match with the previously stored command.
- iii. This project requires manual intervention.

2.2. Reference

1. " RFID-based System for School Children Transportation Safety Enhancement ", Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February 2015.
2. Dr. R. Kamalraj, " A Hybrid Model on Child Security and Activities Monitoring System using IoT", IEEE Xplore Compliant Part Number: CFP18N67-ART; ISBN:978-1-5386-2456-2.
3. Pooja.K.Biradar¹, Prof S.B.Jamge², " An Innovative Monitoring Application for Child Safety", DOI:10.15680/IJIRSET.2015.0409093.
4. Prof. Sunil K Punjabi, Prof. Suvarna Chaure, "Smart Intelligent System for Women and Child Security" Department of Computer Engineering SIES Graduate School of Technology Nerul, Navi Mumbai, India.
5. Sarifah Putri Raflesia, Firdaus, Dinda Lestarini, "An Integrated Child Safety using Geo-fencing Information on Mobile Devices", INTERNATIONAL CONFERENCE ON ELECTRICAL ENGINEERING AND COMPUTER SCIENCE (ICECOS) 2018.

2.3. Problem Statement Definition

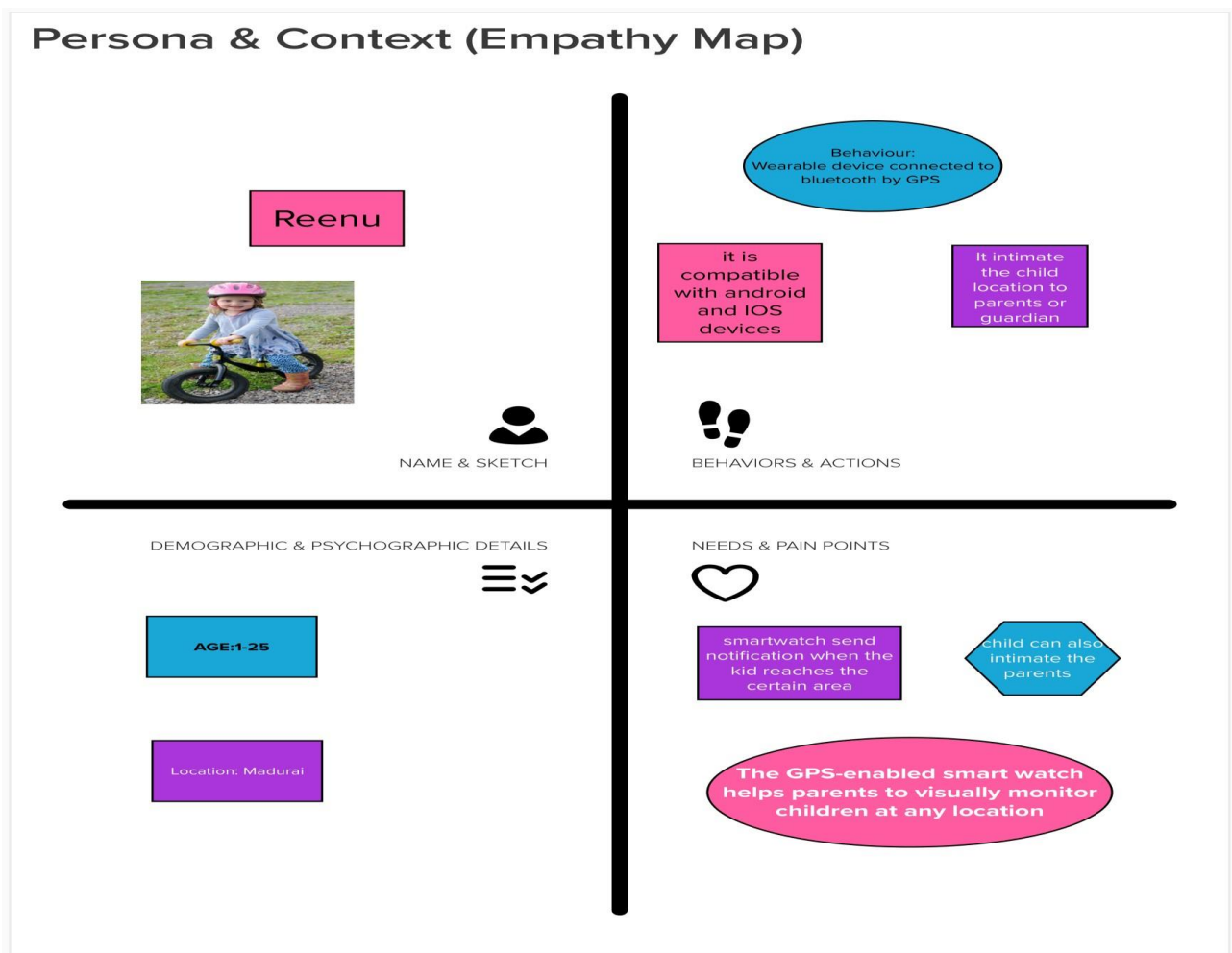
Now a day's Parents have more responsibility than older about their children's. Because Crimes rates are increasing day by day in our country, Crimes such as Child Amusement, Rapes, Murders. We have a solution for monitoring their child activities through mobile phone without their knowledge. We can see their recent activities like Locations in their mobile. For can easily track their current details including GPS Location tracker. This system is implemented for tracking the daily activity of the users with their android mobiles. We have a solution for monitoring their child activities through mobile phone without their knowledge. We can see their recent activites like a Messege.

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IDEATION & PROPOSED SOLUTION

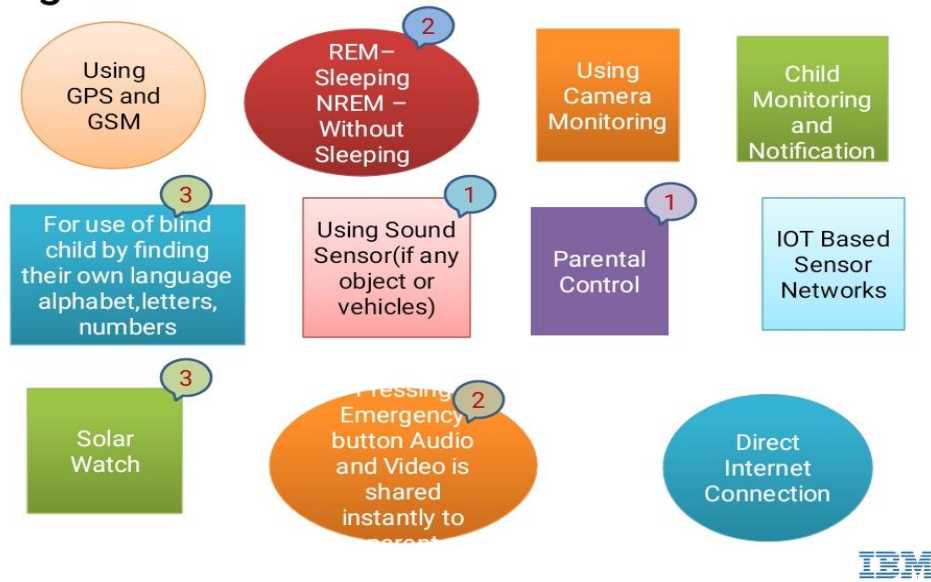
3.1. Empathy Map Canvas

An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment.

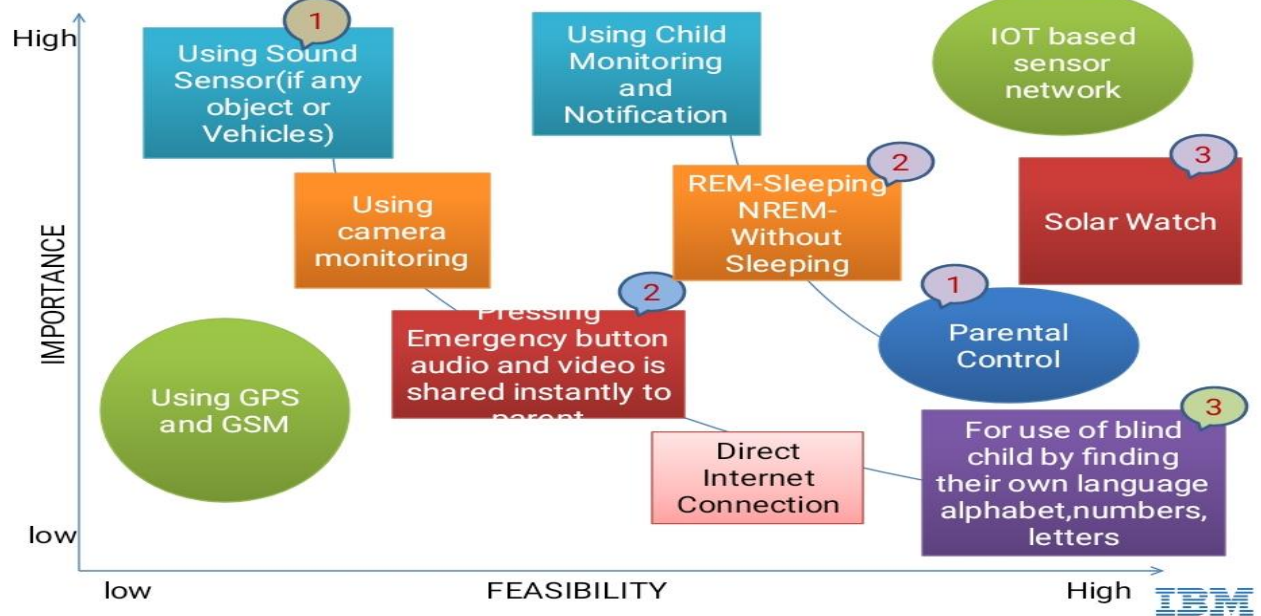


3.2. Ideation and Brainstorming

Big Idea



Idea Prioritization



3.3. Proposed Solution

S.No.	Parameter	Description
	Problem Statement (Problem to be solved)	IOT – based Safety Gadget for Child Safety Monitoring and Notification
	Idea / Solution description	Using Sound Sensor(if any object or Vehicles) Come it will detect it. REM-Sleeping NREM –Without Sleeping we can monitor the child is Sleeping or not.
	Novelty / Uniqueness	For use of blind child by finding their own language alphabet, numbers, letters it will help them to use smart watch. Solar watches if charge is down . Pressing Emergency button audio and video is shared instantly to parent directly through GSM module.
	Social Impact / Customer Satisfaction	Child tracker helps parents to monitor the child location. Improved safety index of places, provides freedom for the children with special needs. Parents track their children in real time of the location tracker by GSM.
	Business Model (Revenue Model)	Selling the product directly to the parents (Device + monthly Subscription for tracking & Notification Service) Selling the product the childcare centers
	Scalability of the Solution	The literature shows that location tracking devices are available in the market, but it does not provide the complete solution to the problem.The solution to this problem is to design an IoT device,which senses the child's location and environment and during emergency, it should send the alert to the parents automatically.

3.4. Problem Solution Fit

Problem-Solution fit canvas 2.0			Purpose / Vision		
Define CS, fit into BE	1. CUSTOMER SEGMENT(S) CS Our customer is a Parents & Child guardian..Segmentation : Location.Tendencies and Frequent actions.Feature of product use.	6. CUSTOMER CONSTRAINTS CC The wearable device prices are Reasonable price.Wearable devices better battery life.The parents and child need uninterrupted internet connections.The device must contain safety , Security & privacy.	5. AVAILABLE SOLUTIONS AS Merits: The child exact locations are found by parents through the Wearable devices.This Wearable devices are indimate the child's surrounding places audio & videos during emergency situation..The wearable device store the data continuously. Demerits: Wearable devices should not proper in all the times.. Sometimes bad weather occurs likely thunder and critical environment issues times.Network issues are the major demerits of wearable device to user communication not properly..		
	2. PROBLEMS J&P Child and women safety is a challenging problem nowadays due to antisocial elements in the society.The crime rate is day by day increasing. Schools and working places need high surveillance for ensuring the safety among children and women. Smart phones are playing major role for ensuring the safety, where some mobile based applications provide alert notifications.	9. PROBLEM ROOT CAUSE RC <ul style="list-style-type: none"> Now a days child kidnaping and child Missing cases are increasing concurrently so the need more security purposes for childrens. Wearable devices are one of the security device Customers (Parents & Guardian) have their child safety and secure because many numbers of possibilities for child insecurity unsafe. 	7. BEHAVIOUR BE Parents implements the security plans for their child themselves. They always think about their child's safety and protection.		
Identify strong TR & EM	3. TRIGGERS TR TriggerThe wearable device have some facilities (Audio&video, Capture picture) in current child location and share data continuously. These facilities are easy to know child exact activities and these are safety too because the parents choosing this type of device for child safety. So ,this type of wearable devices are triggering the customers.	10. YOUR SOLUTION SL IOT Based Safety Gadget for Child Safety Monitoring and notification. If the child is in critical situation , the child press the emergency button the audio and video is captured sent instantly to the parents as a alert message with location	8. CHANNELS of BEHAVIOUR CH 1. ONLINE We notify the information about the child in web application 8.2 OFFLINE You are offline the application show last information about the child's monitoring location.		
	4. EMOTIONS: BEFORE / AFTER EM Before: The parents are feel about the insecure for child and they frequently come Out/Roaming and check their child actives and tendencies. After : The parents feel secure for their child and check their location simultaneously for activities and tendencies in location.				



Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license
Created by Daria Nepriakhina / Amaltama.com



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REQUIREMENTS ANALYSIS

4.1. Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User registration	Registration through Gmail Create an account Follow the instructions
FR-2	User Confirmation	Confirmation via SMS Confirmation via audio and video to mobile.
FR-3	Interface sensor	Interface sensor is set in smart watch of if the child in dangerous sent a alert message to parent.
FR-4	Accessing datasets	Datasets are retrieved from Cloudant DB
FR-5	Mobile application	Alert message is sent but no mobile application

4.2. Non - Functional Requirements

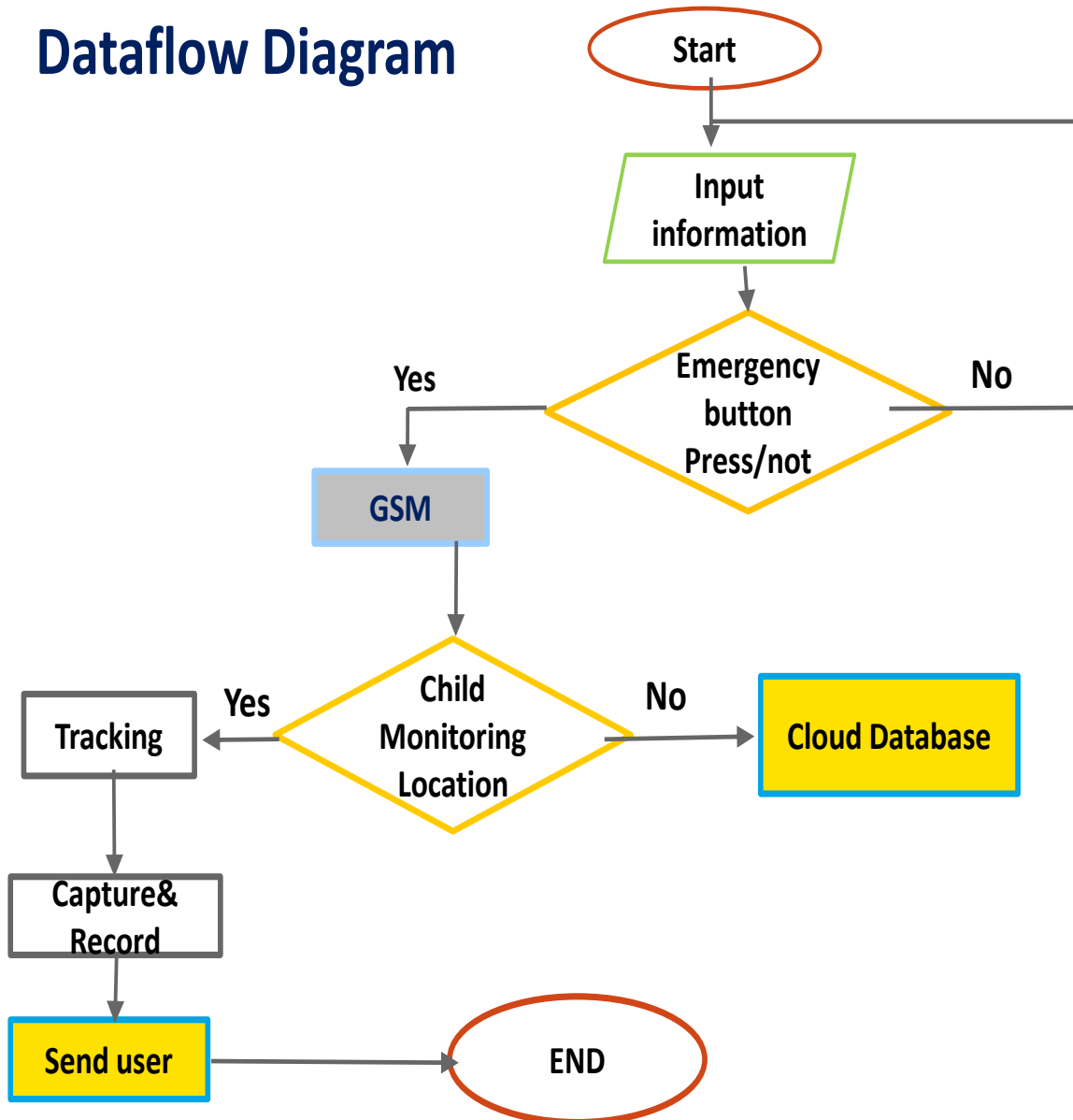
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The Wearble device is used to help the child from critical situation.
NFR-2	Security	We have designed this project to secure the child from the dangerous location.
NFR-3	Reliability	This project will help the parent to monitor the child's location and sends a notification to the parents or guardians.
NFR-4	Performance	IOT devices and sensors are used to indicate the parents through message if the child press the emergency button.
NFR-5	Availability	By developing and deploying resilient hardware and software we can protect the child from dangerous situations.
NFR-6	Scalability	Since this system helps easy to know child exact activities and these are safty too because the parents choosing this type of device for child safety.

CHAPTER - 5

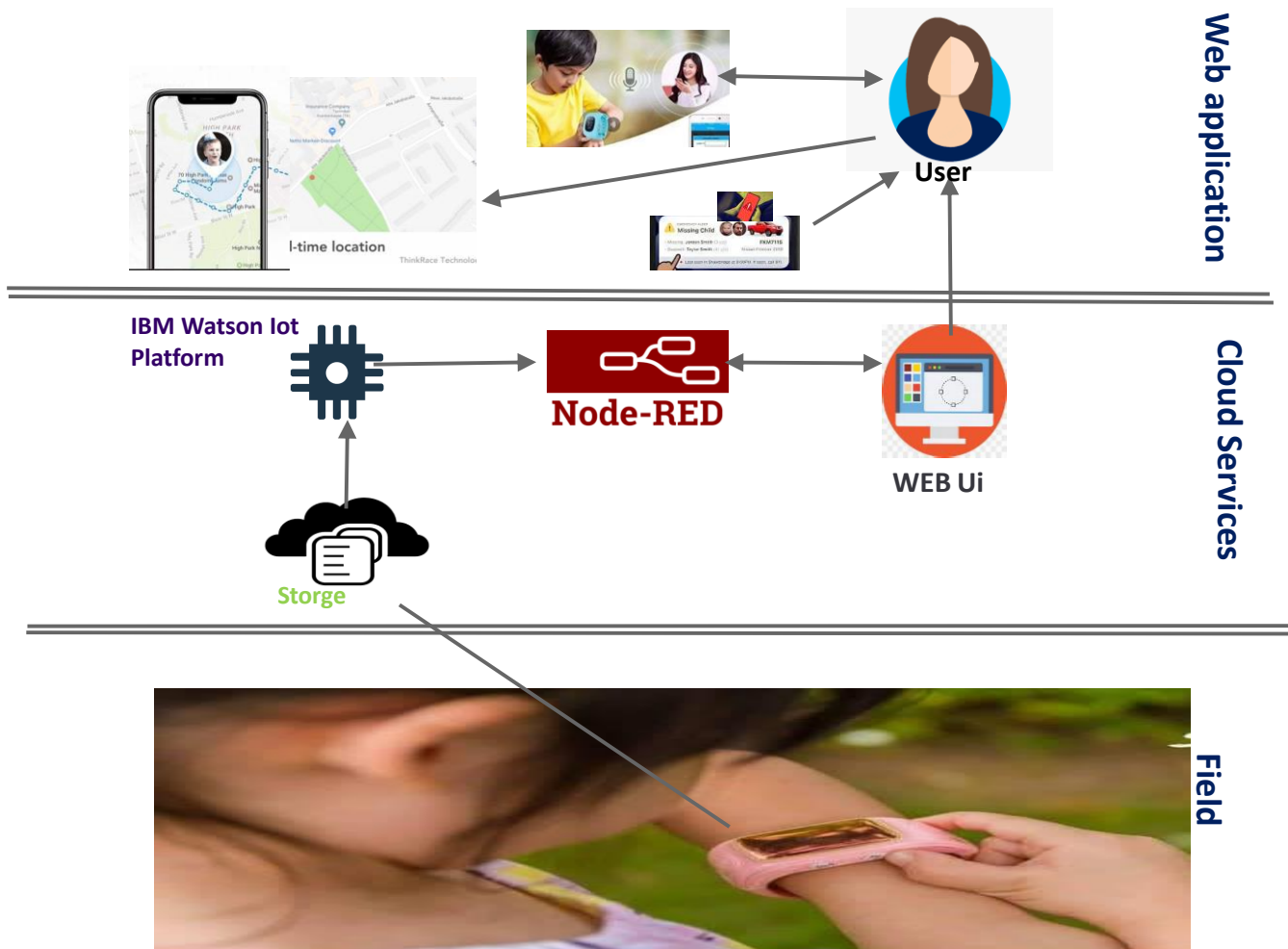
PROJECT DESIGN

5.1. Data Flow Diagram

Dataflow Diagram

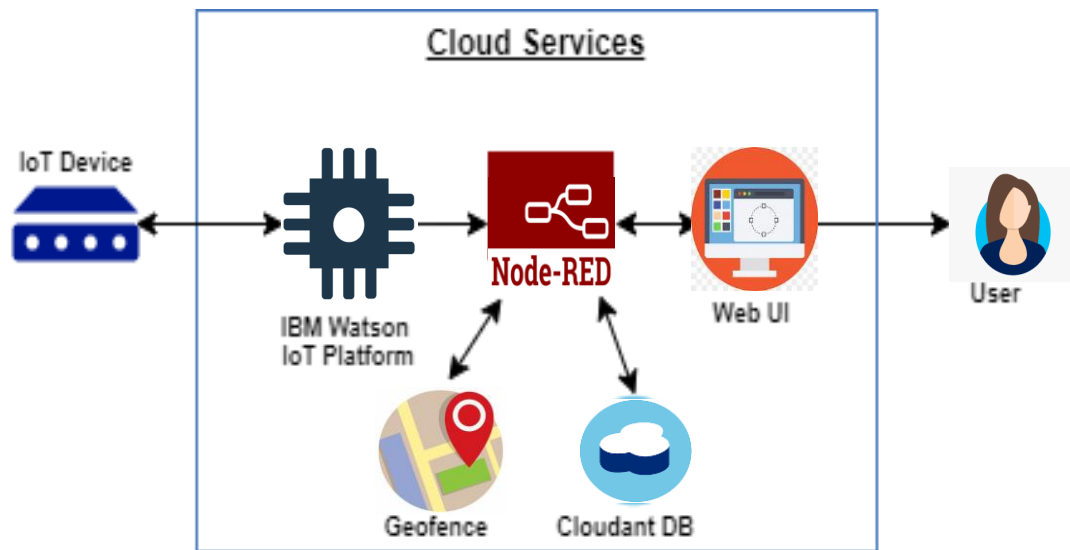


5.2. Solution & Technical Architecture



Technical Architecture


TECHNICAL ARCHITECTURE




5.3. User Stories

User journey


by the design team at [Google](#) and [IDEO](#)



People
2-9









Time
30 min



Difficulty
Beginner

Creating a user journey is a quick way to help you and your team gain a deeper understanding of who you're designing for, aka the stakeholder in your project. The information you add here should be representative of the observations and research you've done about your users. [Learn more](#)

Phases	Needs	Awareness	Action	Monitoring
Steps Detailed description of your user flow to perform	The Child wants to wear the smart watch	If the child is in any dangerous zone	The Child will press the emergency button	The parent will receive the notification from the child
Feelings What your user might be thinking and feeling at this moment	   <div> <div>Less knowledge about child</div> <div>Bad network coverage / issues</div> <div>Emergency may be occurred</div> </div>	 The parents /guardian simultaneously check the child status	 The child in danger zone the parents/guardian verify the child monitoring location	 Then parents check the received captured videos and recordings and communicate the child
Pain points Problems your user runs into	<div> <div>Wearable devices not perfectly handle by child</div> <div>Poor network connection</div> <div>Low battery level</div> </div>	If the watch get lost	If any network issues occur	The parent can't track the child's location if the smart watch battery power is down
Opportunities Potential improvements or enhancements to the experience	<div> <div>Adding to user is easy</div> <div>Better quality devices are required by wearable device</div> <div>Maintenance is easy</div> </div>	Market about the devices in advertisements	Child exact locations updating continuously without interpreted The device send audio and video are in better quality	The wearable devices features are update particular time Maintenance the image of wearable device.

[Share your feedback](#)

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PROJECT PLANNING & SCHEDULING

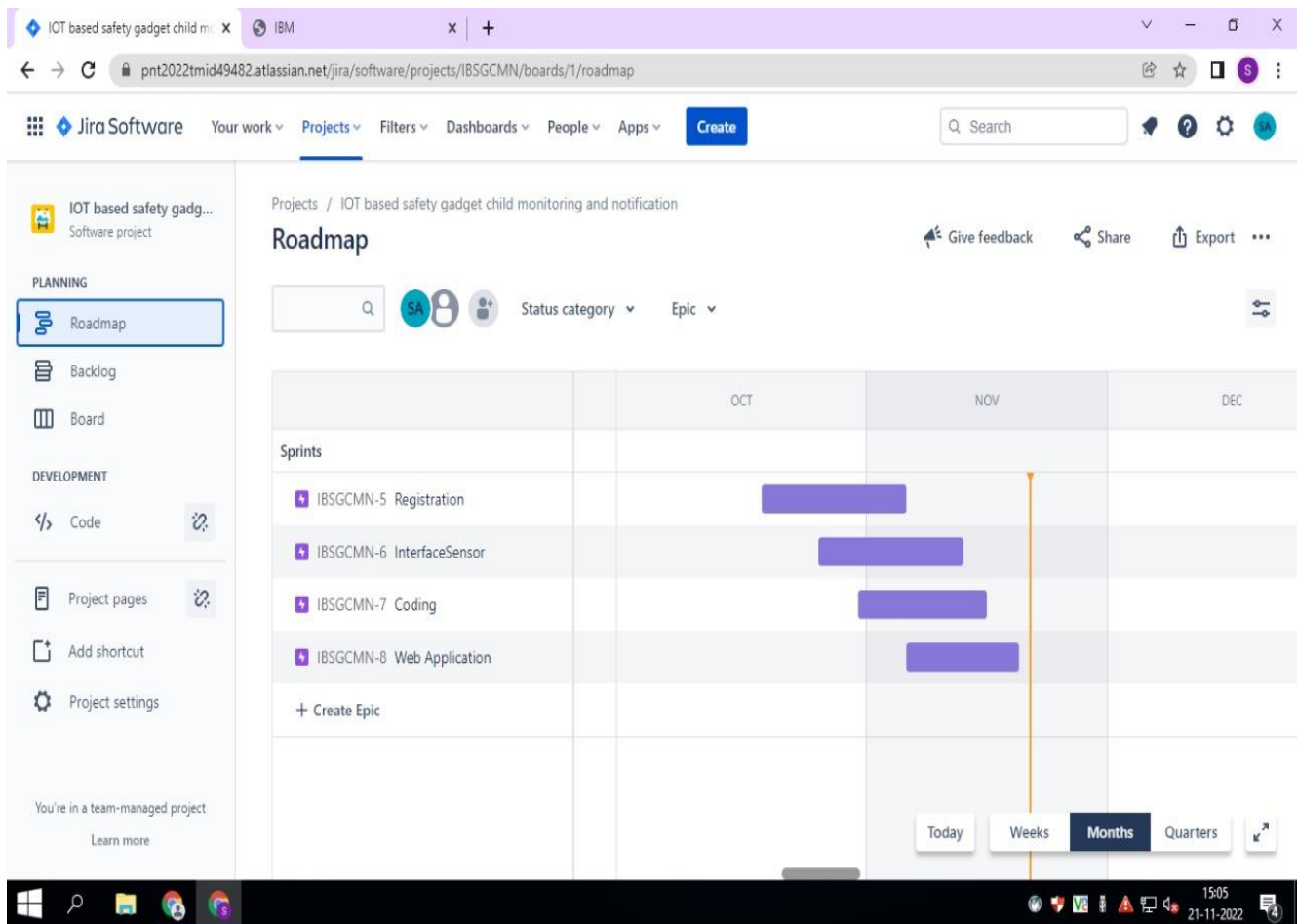
6.1. Sprint planing & Estimation

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 applicationby entering my email,password, and confirming my password.	2	High	Neha N
Sprint-1	User Confirmation	USN-2	As a parent I will receive connection , location in sms / mail once I have entered this application	1	Medium	Priyadharshini S
Sprint-1	Login	USN-3	As a parent/ guardian , I can log into the application by entering mail and password.	2	High	Saranya A
Sprint-2	Interface Sensor	USN-1	A sensor interface is a bridge between a device and any attached sensor. The interface takes data collected by the sensor and outputs it to the attached data.	2	High	Saranya A Yazhini M
Sprint-3	Coding (Accessing datasets)	USN-1	Coding is a set of instructions used to manipulate information so that a certain input results in a particular output.	2	High	Neha N Priyadharshini S Saranya A Yazhini M
Sprint-4	Web Application	USN-1	As a Parent/Guardian,I willshowthecurrent level	1	Medium	Priyadharshini S Yazhini M

6.2. Sprint Delivery Schedule

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	4 Days	24 Oct 2022	27 Oct 2022	20	29 Oct 2022
Sprint -2	20	4 Days	28 Oct 2022	01 Nov 2022	20	04 Nov 2022
Sprint-3	20	4 Days	02 Nov 2022	09Nov 2022	20	11 Nov 2022
Sprint-4	20	4 Days	10 Nov 2022	18 Nov 2022	20	19 Nov 2022

6.3. Reports From JIRA



CHAPTER - 7

CODING AND SOLUTIONING

7.1. Feature

```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random

#Provide your IBM Watson Device Credentials
organization = "myzpw"
deviceType = "raspberrypi"
deviceId = "demo123"
authMethod = "token"
authToken = "12345678"

try:
    deviceOptions = {"org": organization, "type": deviceType, "id": deviceId, "auth-
method": authMethod, "auth-token": authToken}

    deviceCli = ibmiotf.device.Client(deviceOptions)

    #.....

except Exception as e:
    print("Caught exception connecting device: %s" % str(e))

    sys.exit()

# Connect and send a datapoint "hello" with value "world" into the cloud as an event
of type "greeting" 10 times

deviceCli.connect()
```

while True:

 #Get Sensor Data from DHT11

 name="seetha"

 latitude=9.9179987

 longitude=78.0527826

 data = { 'name' : name, 'latitude': latitude, 'longitude':longitude }

 #print data

 def myOnPublishCallback():

 print ("Published name = %s " % name, "latitude = %s " % latitude, "longitude
= %s " % longitude, "to IBM Watson")

 success = deviceCli.publishEvent("IoTSensor", "json", data, qos=0,
on_publish=myOnPublishCallback)

 if not success:

 print("Not connected to IoTTF")

 time.sleep(5)

 deviceCli.commandCallback = 'myOnPublishCallback'

client.disconnect()

Device Details

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Add Device

Browse Devices

All Devices Diagnose

This table shows a summary of all devices that have been added. It can be filtered, organized, and searched on using different criteria. To get started, you can add devices by using the Add Device button, or by using API.

Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
demp1	Connected	rasberry1	Device	Nov 19, 2022 5:15 PM	
rasberry1_1	Disconnected	rasberry1	Device	Nov 19, 2022 5:00 PM	

Items per page 50 | 1-2 of 2 items

1 of 1 page

Recent Events

IBM Watson IoT Platform

Browse Action Device Types Interfaces

Add Device

Search by Device ID

Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
demp1	Connected	rasberry1	Device	Nov 19, 2022 5:15 PM	

Identity Device Information Recent Events State Logs

The recent events listed show the live stream of data that is coming and going from this device.

Event	Value	Format	Last Received
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago

Node-Red Connection and Dashboard Design

The screenshot shows the Node-RED web interface. On the left, a palette of nodes is visible. The main workspace contains a flow with the following components:

- Flow 1:** Starts with an **IBM IoT** node (connected), followed by a **function** node, then a **worldmap** node (connected).
- Flow 2:** Starts with a **switch** node, which branches into four **function** nodes. These functions connect to various output nodes including **msg.payload**, **show dialog**, **saranyakumar0609@gmail.com**, and **email**.

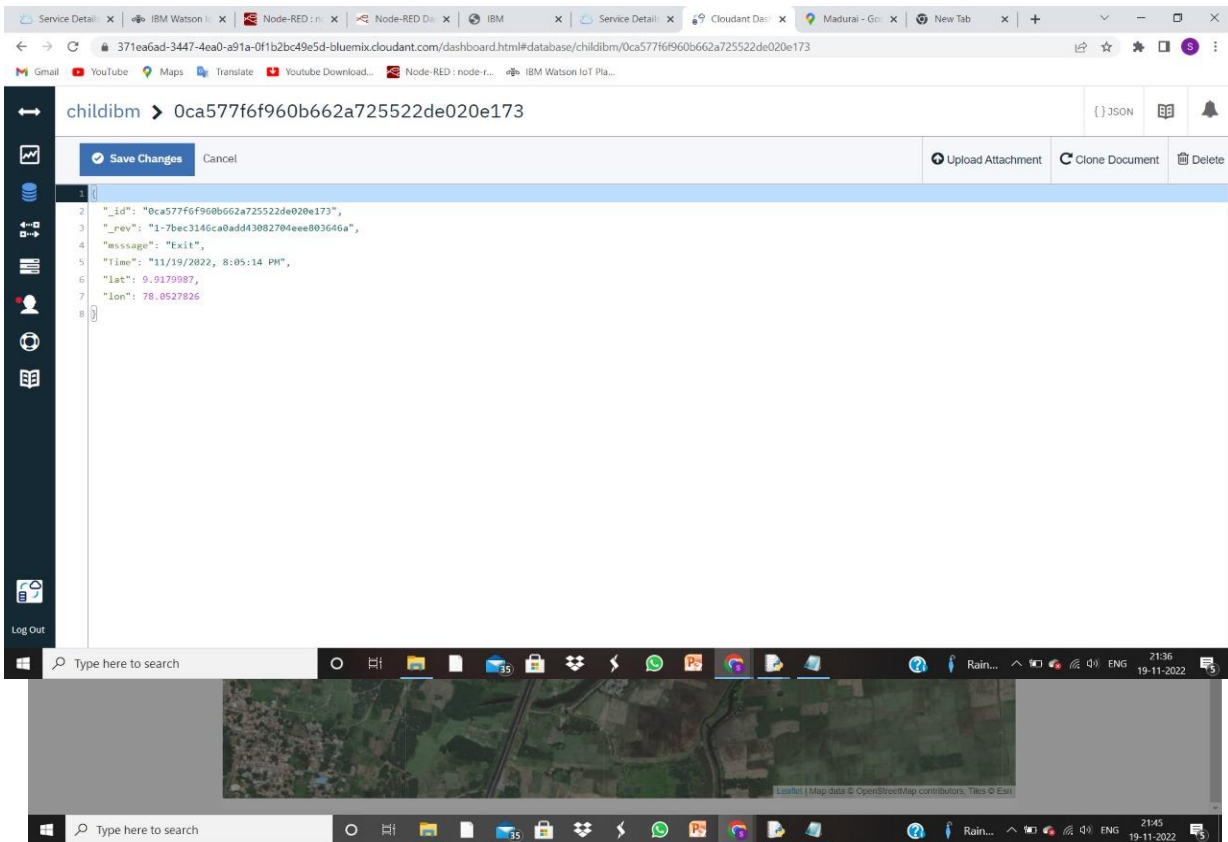
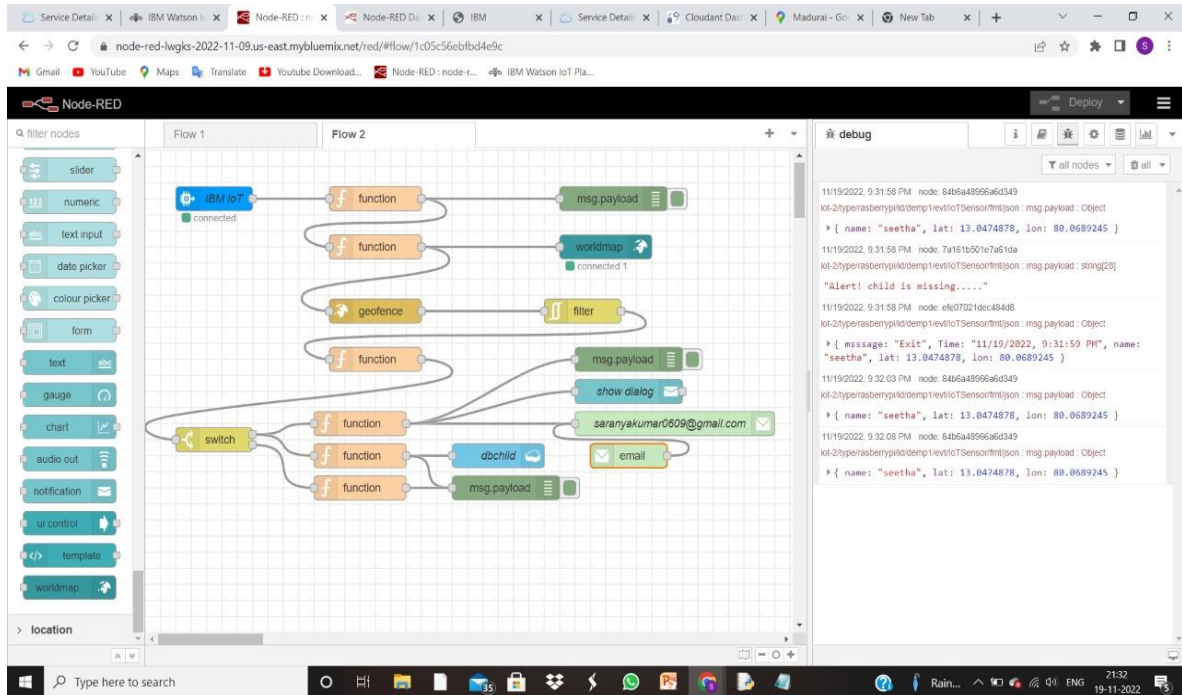
On the right, a **dashboard** is displayed with tabs for **Layout**, **Site**, and **Theme**. The **Layout** tab shows a group of widgets under **Child Safety**, including a **worldmap** and a **spacer 19x1**. A message at the bottom of the dashboard states: "There are 5 widgets not in a group. Click here to create the missing groups".

The screenshot shows the IBM Watson IoT Platform dashboard. The top navigation bar includes **Browse**, **Action**, **Device Types**, and **Interfaces**. The main content area displays a table of devices, with the first device selected:

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
demp1	Connected	rasberryPi	Device	Nov 19, 2022 5:15 PM	

Below the table, the **Recent Events** tab is active, showing a list of events:

Event	Value	Format	Last Received
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago
IoTSensor	{"name":"seetha","lat":13.0474878,"lon":80.068...	json	a few seconds ago



id	key	value
Oca57716f960b662a725522de020e173	Oca57716f960b662a725522de020e173	{ "rev": "1-7bec3146ca0add43082704eee80..." }
1286d5bd6ae10d62889a238f39a5338	1286d5bd6ae10d62889a238f39a5338	{ "rev": "1-24975024e62a941471030f2a1f12..." }
1975d93f39537228dd241d5d7e1bf360	1975d93f39537228dd241d5d7e1bf360	{ "rev": "1-ba5ac5d6bb2a22b4e38b90ab26..." }
1975d93f39537228dd241d5d7e6c2e4a	1975d93f39537228dd241d5d7e6c2e4a	{ "rev": "1-96983f146a8c0f1045ae0719d91..." }
354bbec342c2e75fa985cc9185150631	354bbec342c2e75fa985cc9185150631	{ "rev": "1-395559f76c2d99d4132fcb43ce1..." }
3bfc45329024547693da0d89cd4fdae0	3bfc45329024547693da0d89cd4fdae0	{ "rev": "1-ad6c22f0380976accd7456c981aa..." }
3bfc45329024547693da0d89cd62af7	3bfc45329024547693da0d89cd62af7	{ "rev": "1-bbeda32928a6759a3278618b06c..." }
3e71363546057dd85c1afe49a1cf22cc	3e71363546057dd85c1afe49a1cf22cc	{ "rev": "1-ad91e1032eac49f690f566985b4..." }
4f15a7aa5001c87b187573f9241e86a	4f15a7aa5001c87b187573f9241e86a	{ "rev": "1-4c5cb882329edc28c5b2792d790..." }
50617e50d33d06d476c9a3c5e0e1a2a7	50617e50d33d06d476c9a3c5e0e1a2a7	{ "rev": "1-9e07af842e95037ed5e8d5b43338..." }
547d79d47013c127d169e135982c3a62	547d79d47013c127d169e135982c3a62	{ "rev": "1-88024206ccbc5c50ed356c46a..." }
599c3081a334e8a8bea6b684d1ddb34	599c3081a334e8a8bea6b684d1ddb34	{ "rev": "1-a5ef28a98db99dd64cba73f04dd..." }
72d09a586cb96d683d3ffe234855c011	72d09a586cb96d683d3ffe234855c011	{ "rev": "1-5e4b051e2723984c167098e3559..." }

CHAPTER - 8

9 deleted messages in this conversation
Display

8.1. T

**iot-2/type/raspberrypi/id/
demo123/evt/loTSensor/fmt/
json**
Inbox

childsafetymonitoring... 2:54 pm

to me

Alert! child is missing.....

8.2. User 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 CHILD 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	7	3	6	5	21
Duplicate	4	0	3	0	7
External	1	2	0	1	4
Fixed	14	1	3	8	26
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	4	2	0	6
Totals	26	11	18	19	67

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	5	0	0	5
Client Application	30	0	0	30
Security	2	0	0	2
Outsource Shipping	1	0	0	1
Exception Reporting	7	0	0	7
Final Report Output	9	0	0	9
Version Control	1	0	0	1

CHAPTER - 9

RESULTS

9.1. Performance Metrics

1. Requirement Identification

- Functional Requirements
- Non-Functional Requirements

2. Implementation result

- System Implementation results
- Results of web application Implementation

3. Resource utilization results

- Child activities results
- Child location results

4 . Alert Mail results

CHAPTER - 10

ADVANTAGES & DISADVANTAGES

10.1. ADVANTAGES

1. The child exact locations are found by parents through the Wearble devices.
2. This Wearble devices are indimate the child's parents during emergency situation.
3. The wearble device store the data continueously.
4. This wearable devices send the mail to child's parents during emergency situation.

10.2. DISADVANTAGES

1. Wearable devices should not proper in allthe times.
2. Sometimes bad weather occurs likely thunder and critical environment issues times.
3. Network issues are the major demirts of wearble device to user communication not properly.

CHAPTER - 11

CONCLUSION

The word Future resembles the word Children. As Dr. A.P.J Abdul Kalam's words "Youngsters are the future pillars of one's nation", 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 abuse, 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.

CHAPTER - 12

FUTURE SCOPE

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

CHAPTER - 13

APPENDIX

GitHub : <http://bitly.ws/wVza>

Project Demo Link : <https://bit.ly/3Osz6P1>