IoT based Safety Gadget for Child Safety Monitoring & Notification

Submitted by

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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

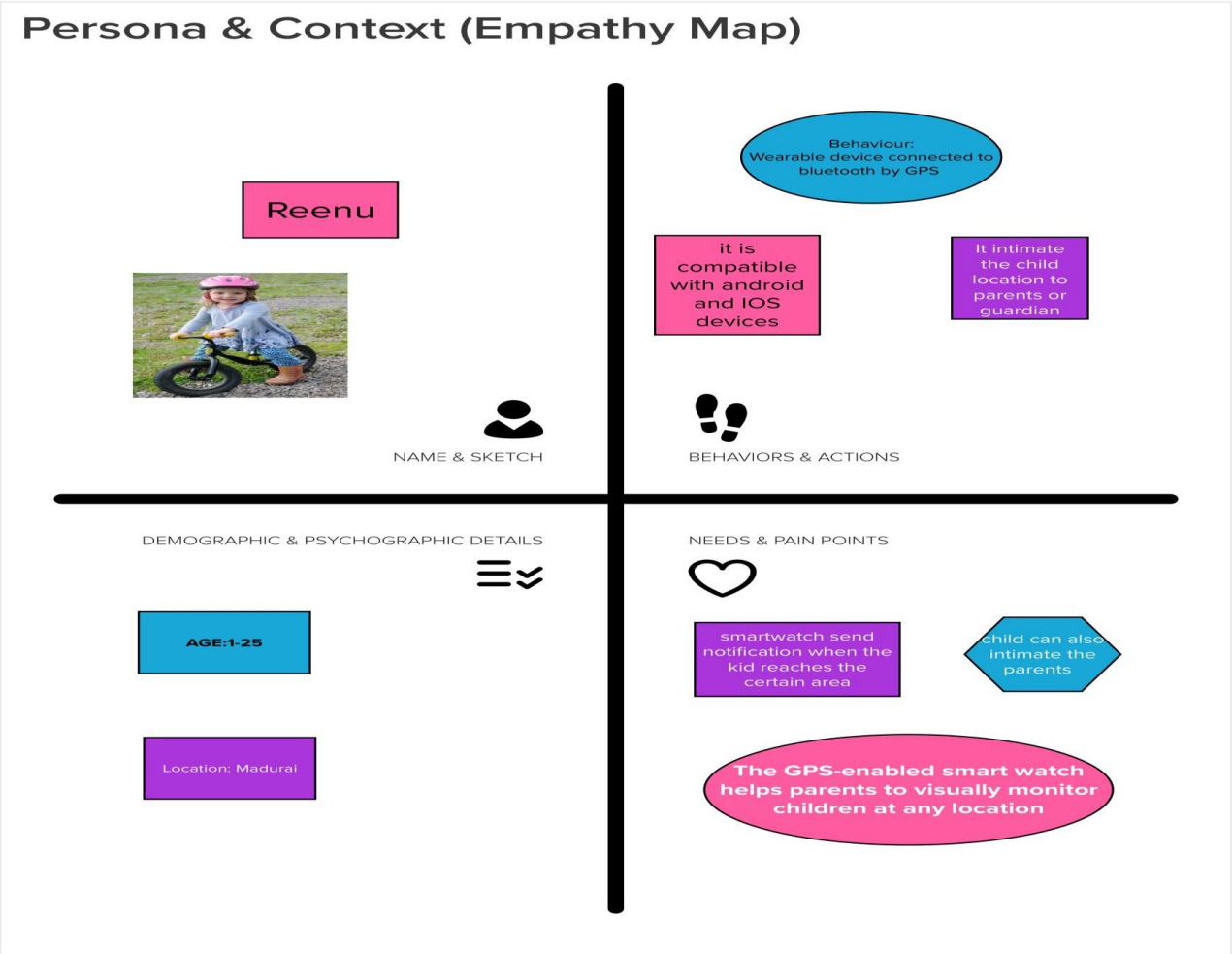
Now a day’s Parents have more responsibility than older about their children's. Because Crimes rates are increasing day by day in our country, Crimes such as Child Amusement, Rapes, Murders. We have a solution for monitoring their child activities through mobile phone without their knowledge. We can 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.

CHAPTER - 3

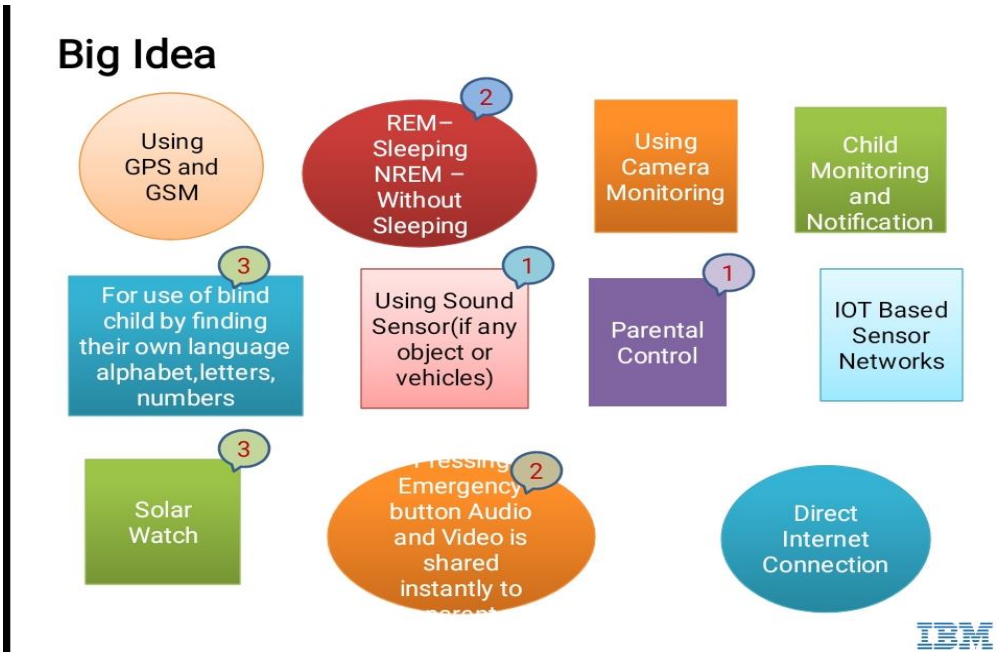
IDEATION & PROPOSED SOLUTION

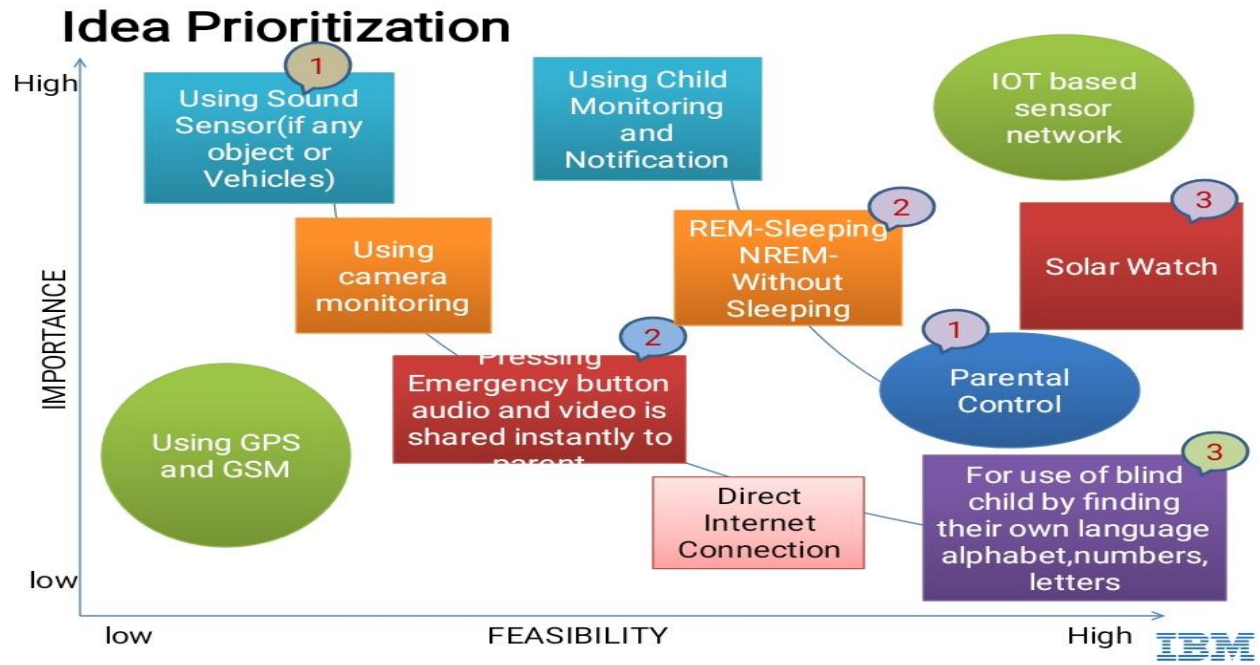
3.1. Empathy Map Canvas

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





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 watchs 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 childern 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

CHAPTER - 4

REQUIREMENTS ANALYSIS

4.1. Functional Requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User registration	Registration through GmailCreate 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

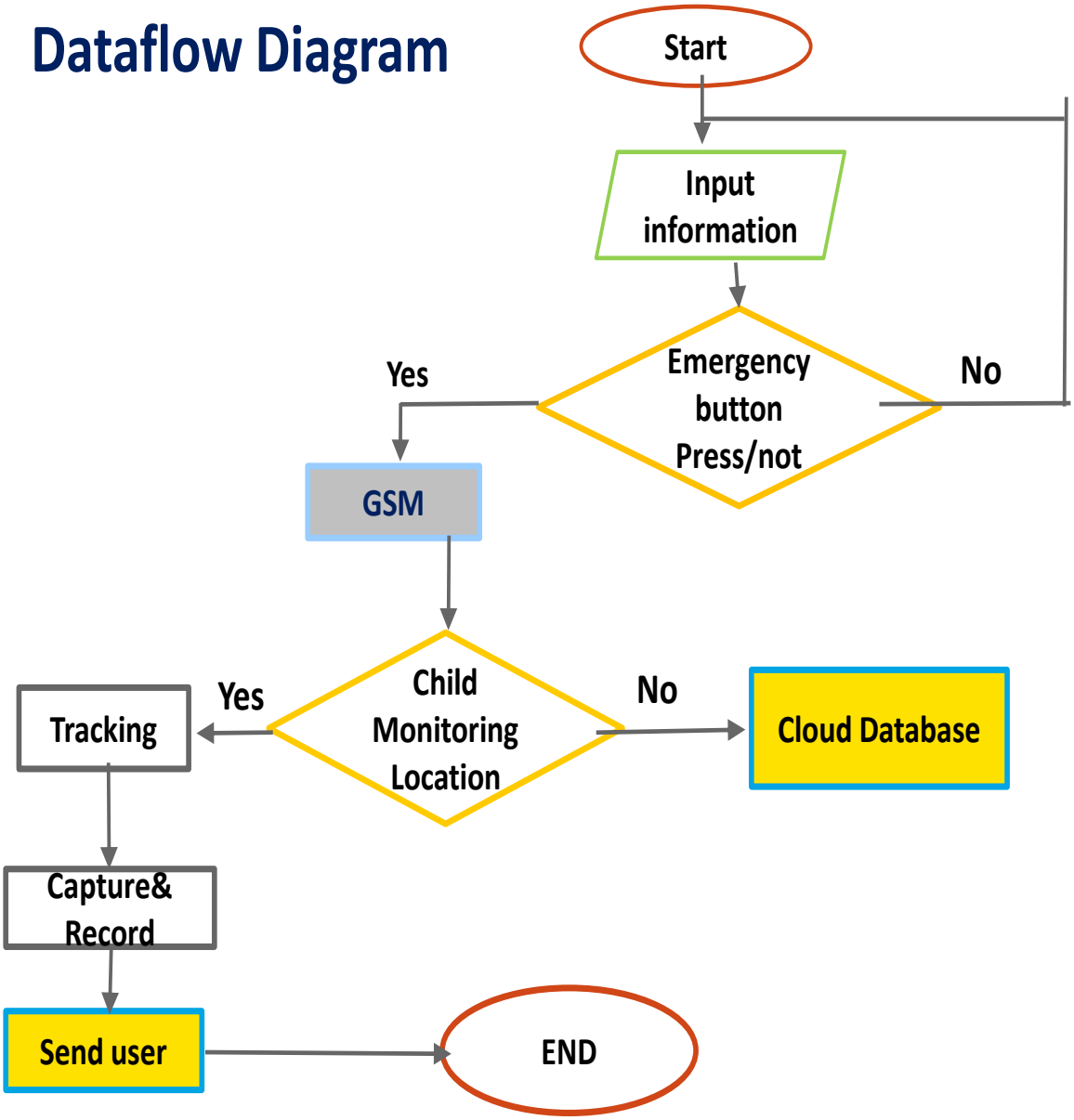
4.2. Non - Functional Requirements

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 thechild 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

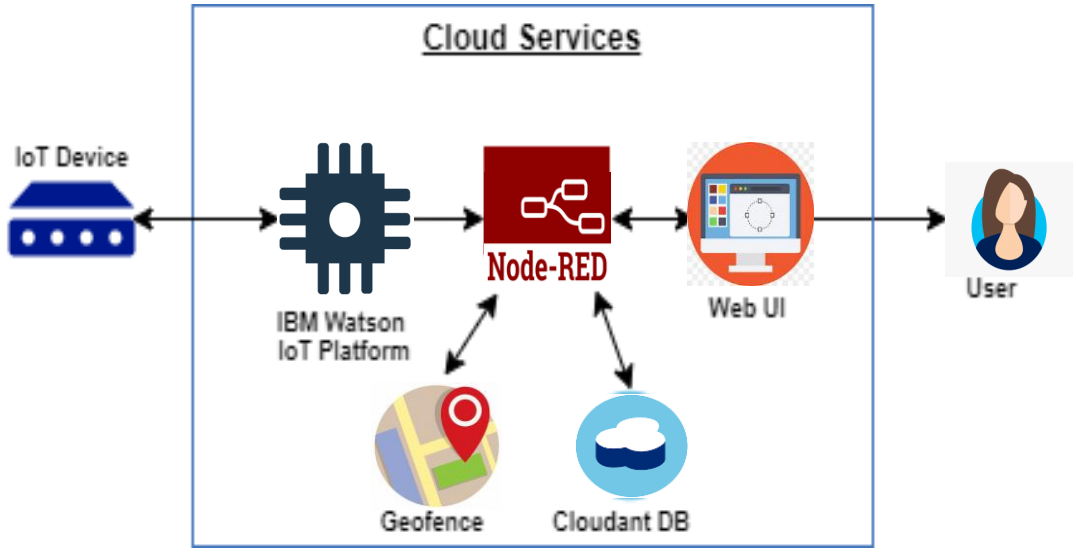
5.1. Data Flow Diagram



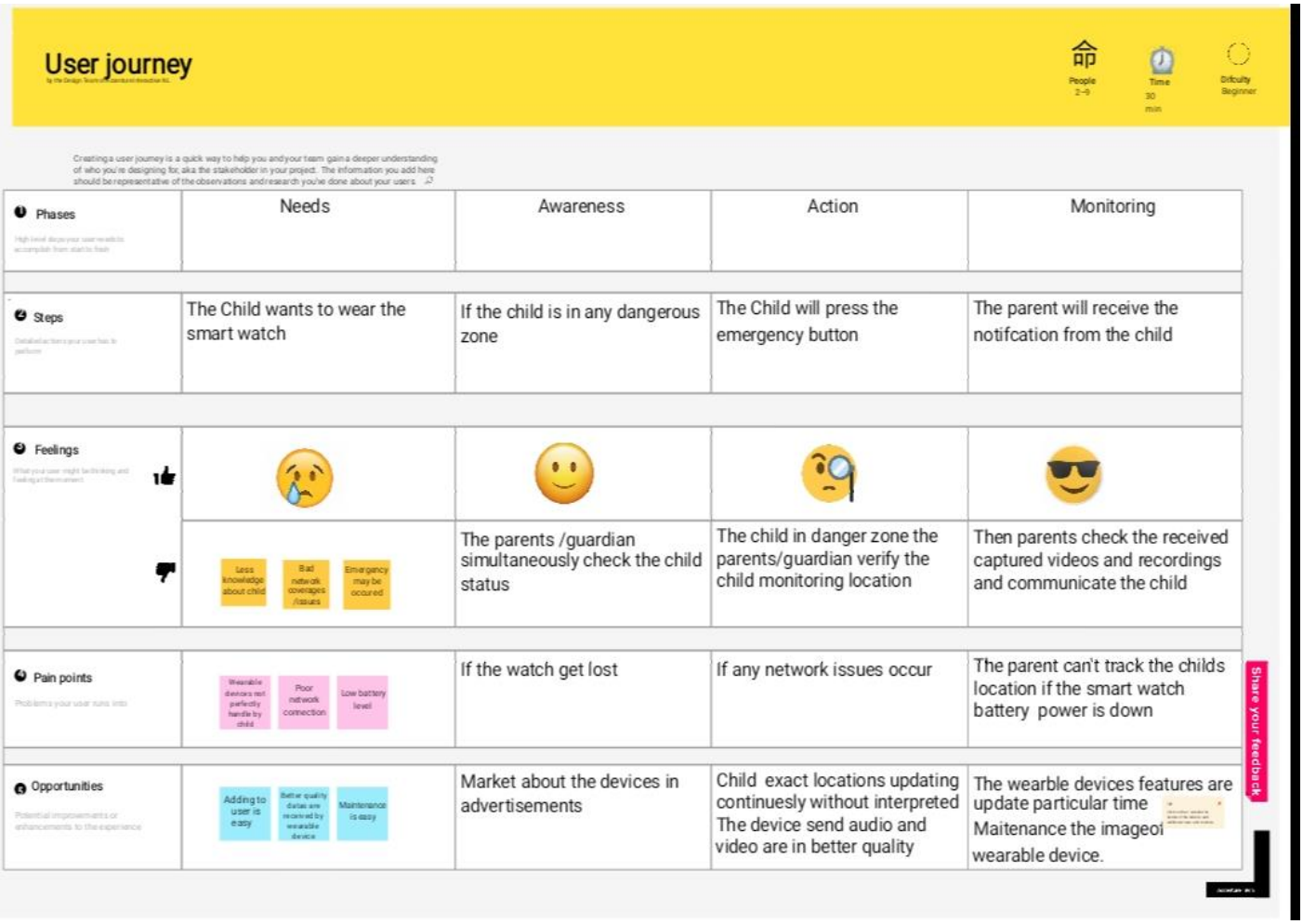
5.2. Solution & Technical Architecture

Technical Architecture

TECHNICAL ARCHITECTURE



5.3. User Stories



User journey

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.

Phases	Needs	Awareness	Action	Monitoring
Steps	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 notifcation from the child
Feelings				
	Less knowledge about child; Bad network coverages /issues; Emergency may be occured	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	Wearable devices not perfectly handle by child; Poor network connection; Low battery level	If the watch get lost	If any network issues occur	The parent can't track the childs location if the smart watch battery power is down
Opportunities	Adding to user is easy; Better quality datas are received by wearable device; Maintenance is easy	Market about the devices in advertisements	Child exact locations updating continuesly without interpreted The device send audio and video are in better quality	The wearble devices features are update particular time Maitenance the imageoi wearable device.

Share your feedback

CHAPTER - 6

PROJECT PLANNING & SCHEDULING

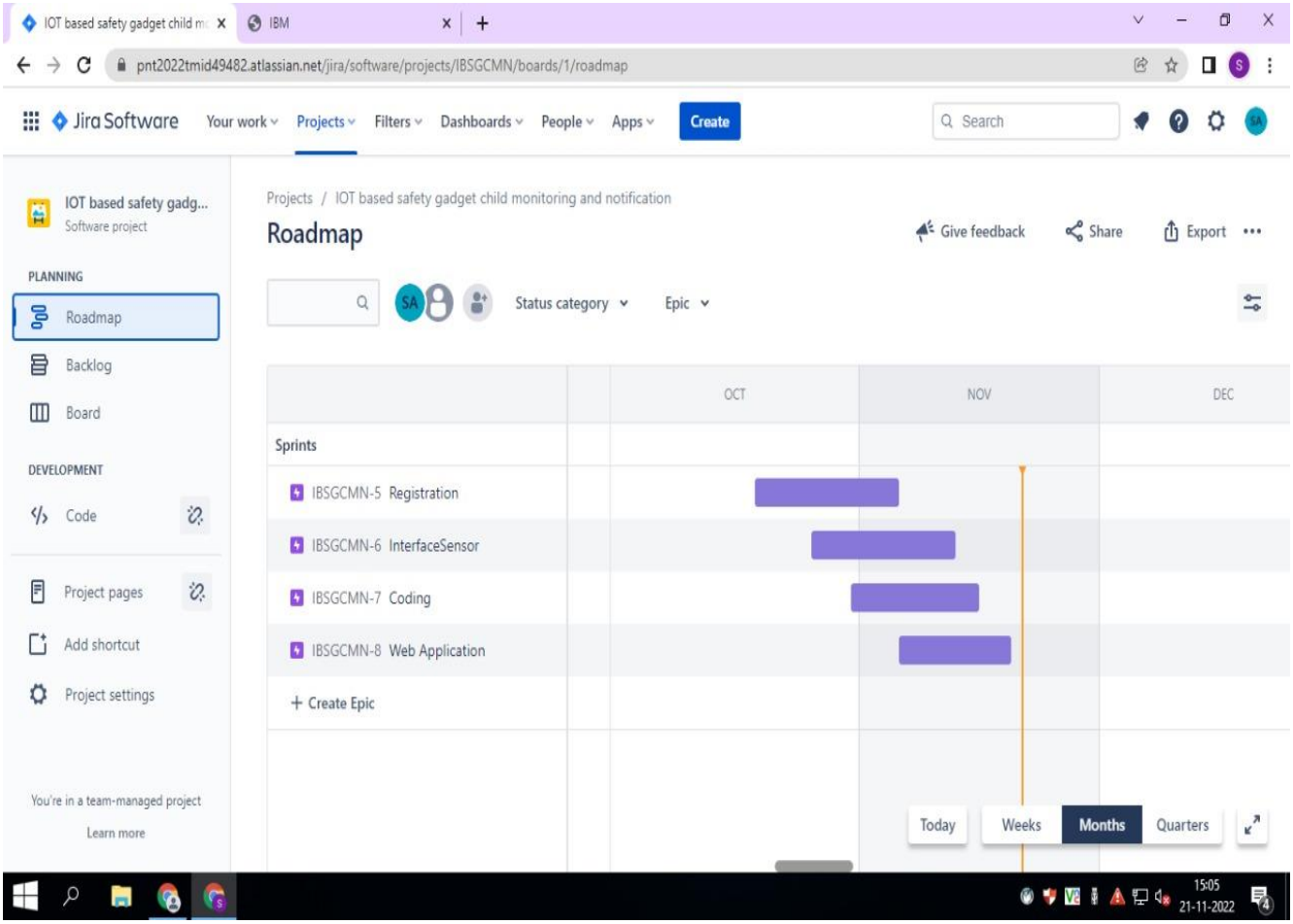
6.1. Sprint planing & Estimation

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

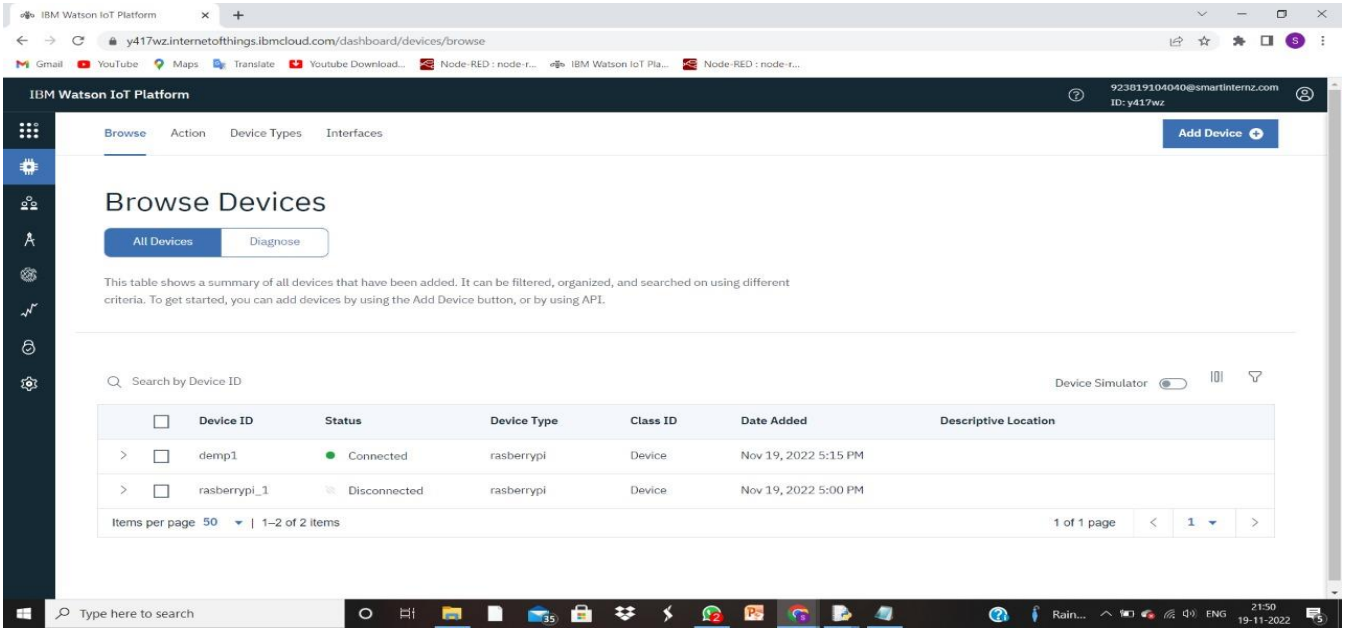
CODING AND SOLUTIONING

7.1. Feature

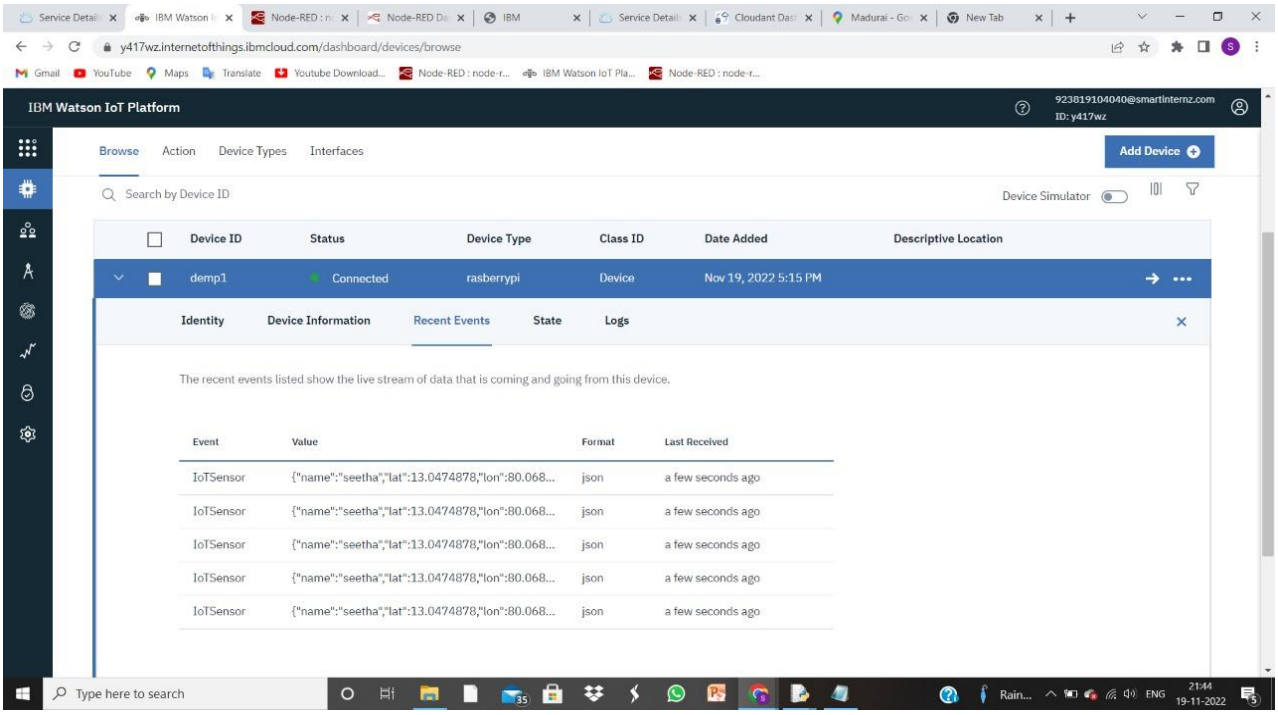
```
import time
import sys
import ibmiotf.application
import ibmiotf.device
import random
#Provide your IBM Watson Device Credentials
organization = "myzpwb"
deviceType = "raspberrypi"
deviceId = "demo123"
authMethod = "token"
authToken = "12345678
try:
        deviceOptions = {"org": organization, "type": 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 IoTF")
        time.sleep(5)


        deviceCli.commandCallback = 'myOnPublishCallback'



client.disconnect()
```

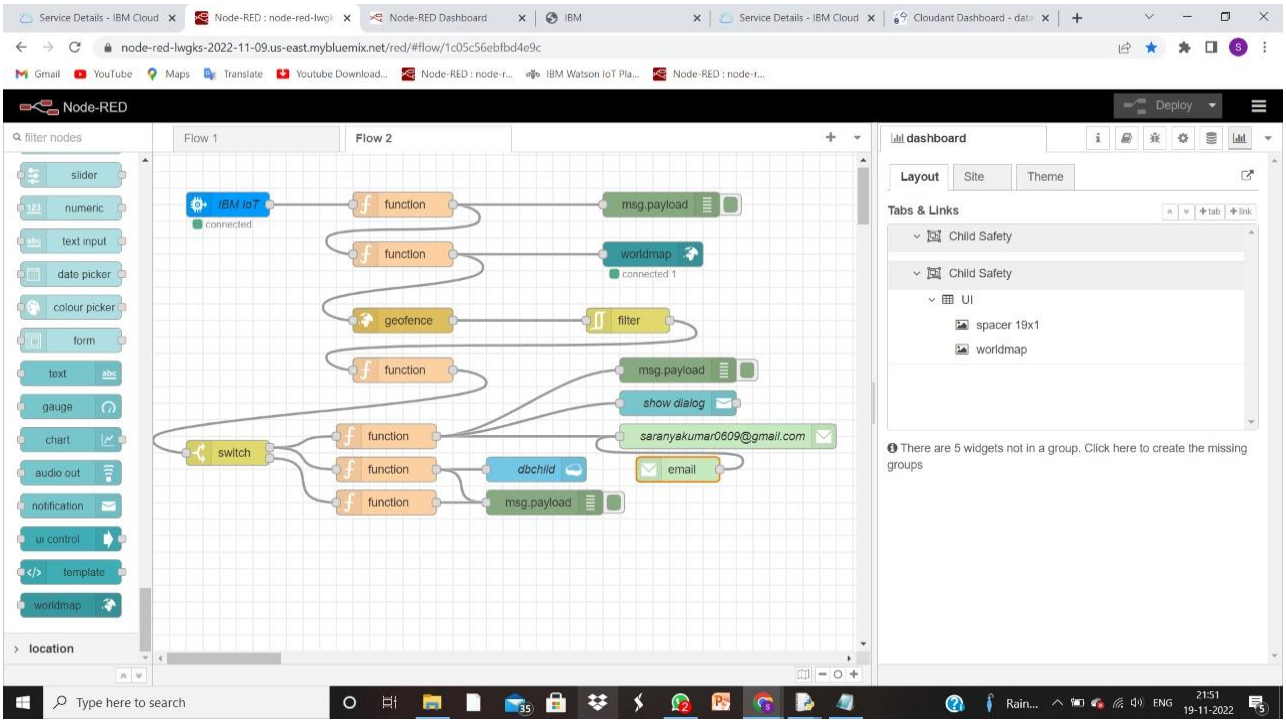
Device Details

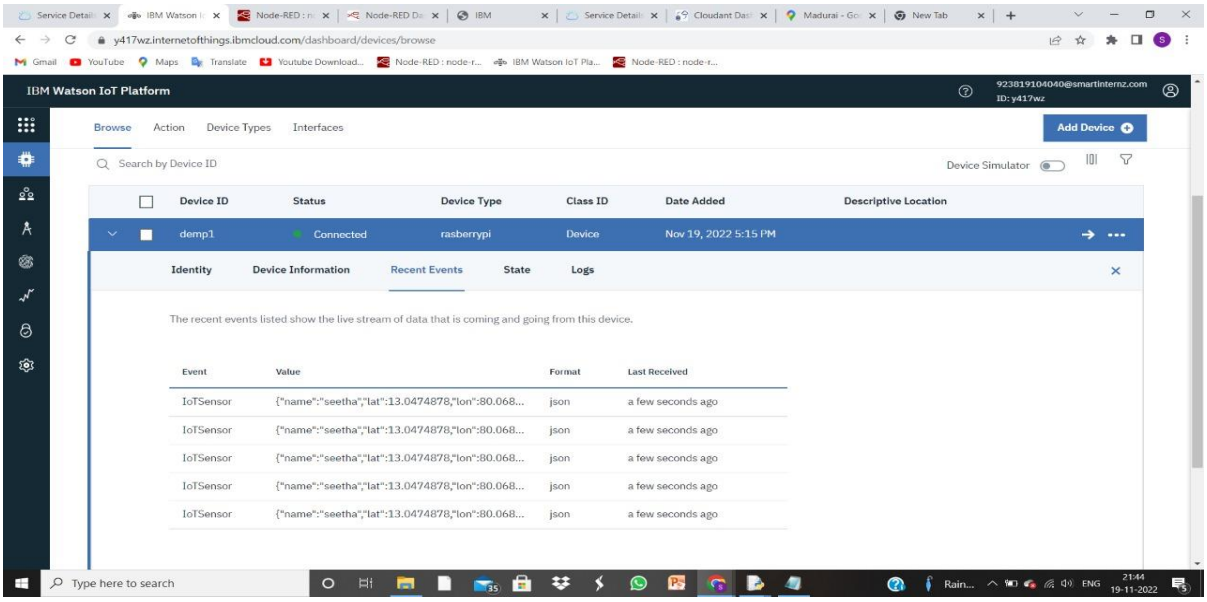


Recent Events



Node-Red Connection and Dashboard Design


Node-RED
Flow 1
Flow 2
dashboard
Layout
Site
Theme
Tabs & Links
Child Safety
UI
spacer 19x1
worldmap
IBM IoT
connected
function
msg.payload
worldmap
connected 1
geofence
filter
show dialog
switch
dbchild
email
saranyakumar0609@gmail.com
There are 5 widgets not in a group. Click here to create the missing groups


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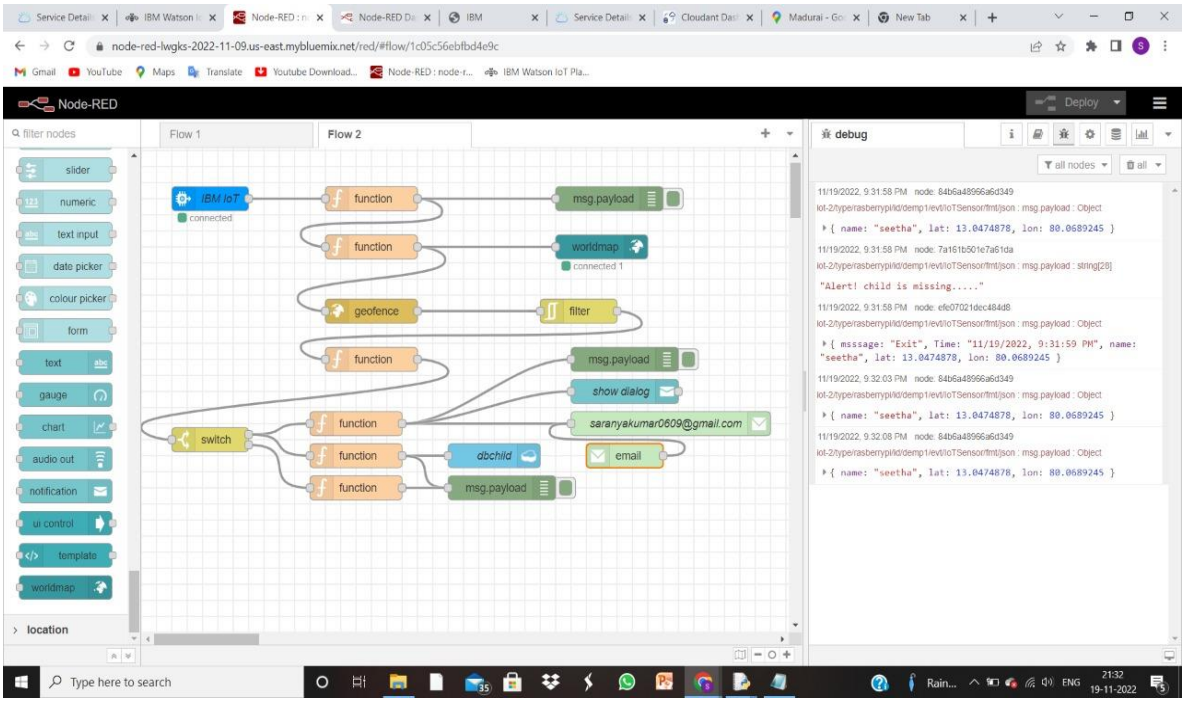
Last Received
IoTSensor
{"name":"seetha","lat":13.0474878,"lon":80.068...
json
a few seconds ago


Node-RED
Deploy
Flow 1
Flow 2
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filter
msg.payload
show dialog
saranyakumar0609@gmail.com
dbchild
email
msg.payload
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date picker
colour picker
form
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audio out
notification
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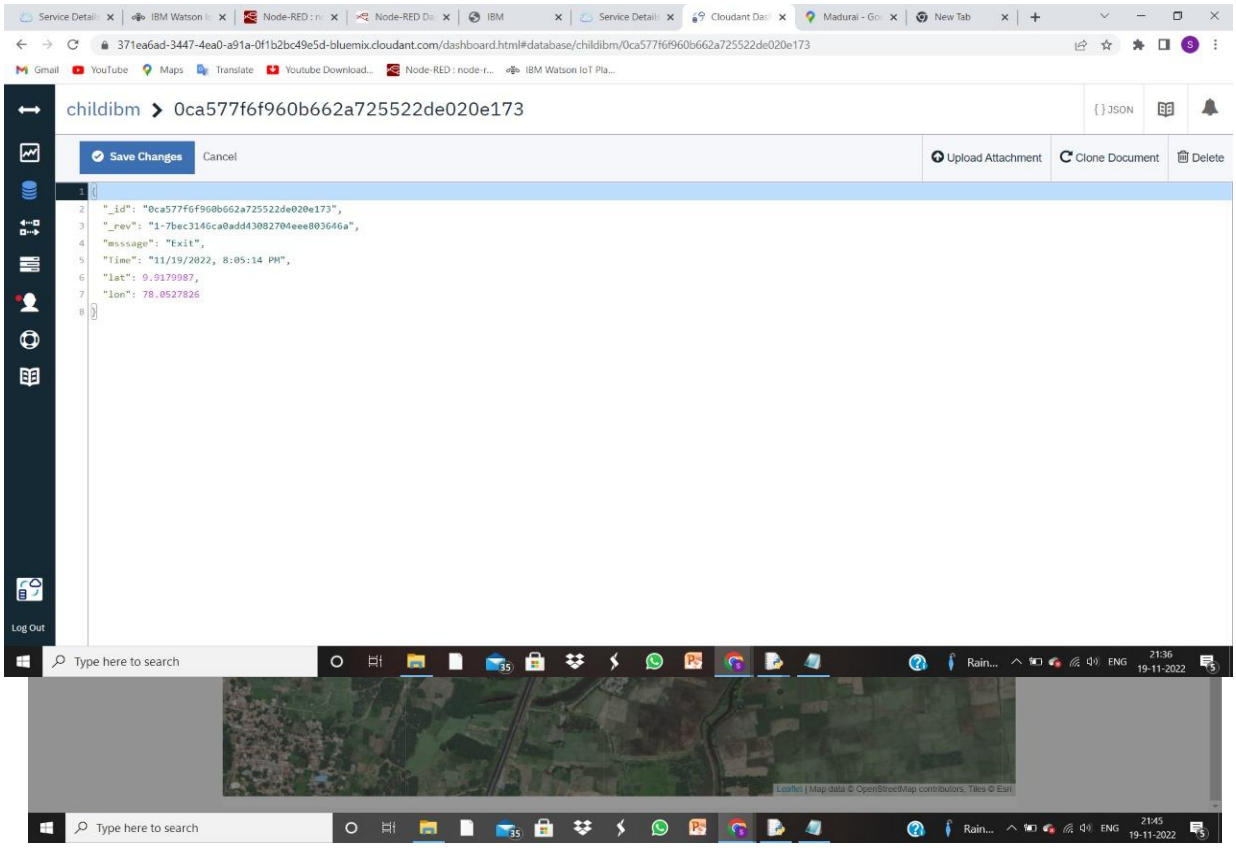
worldmap
location
Type here to search


childibm > 0ca577f6f960b662a725522de020e173
{ } JSON
Save Changes
Cancel
Upload Attachment
Clone Document
Delete
"_id": "0ca577f6f960b662a725522de020e173",
"_rev": "1-7bec3146ca0add43082704eee803646a",
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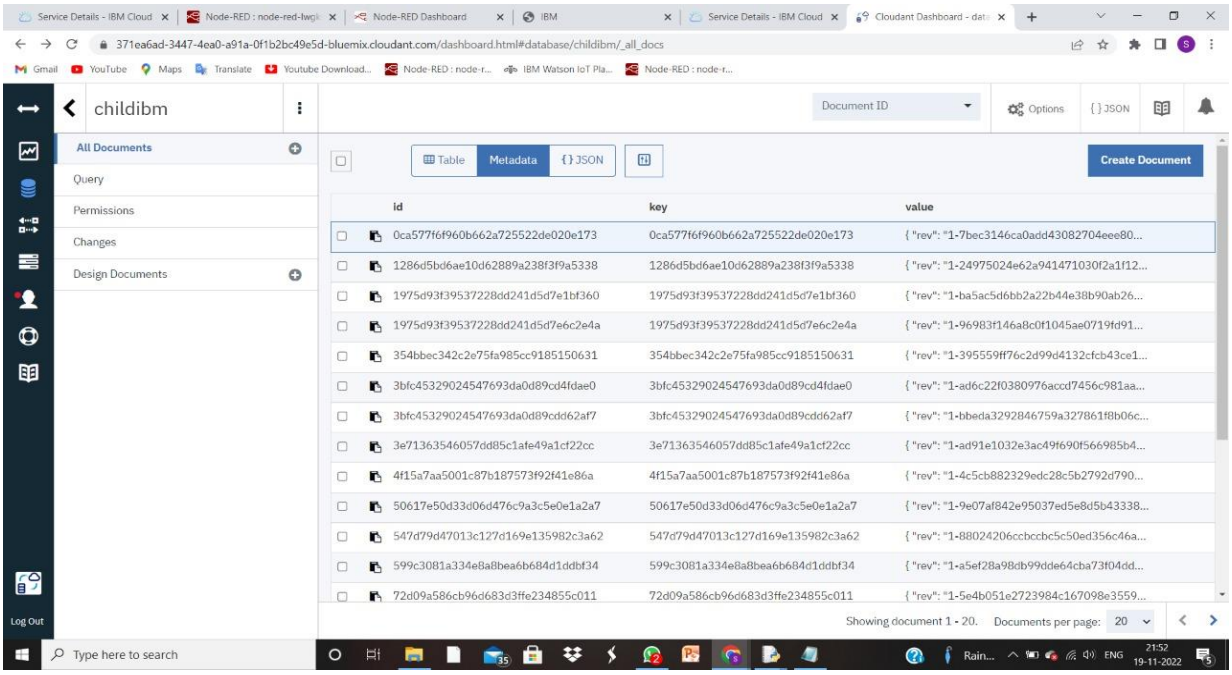
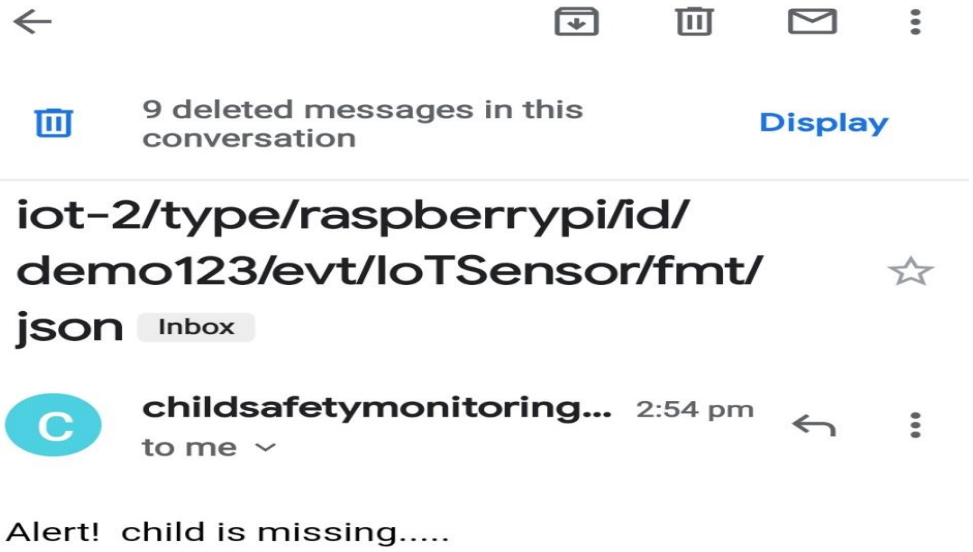
"lon": 78.0527826
Log Out
Type here to search



CHAPTER - 8

8.1. T



8.2. User Acceptance Testing

1. PurposeofDocument

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 releasetoUserAcceptance Testing(UAT).

2. DefectAnalysis

Thisreportshowsthenumberofresolvedorclosedbugsat eachseveritylevel,andhow 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. TestCaseAnalysis

Thisreportshowsthenumber of testcasesthathavepassed,failed,anduntested

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 abusements, 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 lively 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