IBM REPORT

Project Title :

IoT Based Safety Gadget for Child Safety Monitoring & Notification

TEAM ID:PNT2022TMID17406

Submitted by-

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INDEX

1.INTRODUCTION:

Project Overview: Internet of Things (IoT) is a set of systems and devices interconnected with real-world sensors and actuators to the Internet. It is able to make decisions via detecting the surrounding environment without human interaction. In this project, IoT is applied to propose which helps parents to monitor and get known of their child's condition at anywhere and anytime even if they are not by their children side, Via the IoT , children safety is guaranteed, and crime rate is reduced as immediate actions can be taken in case the child is in danger.The use of IoT in this device is motivated by the need of child security system. Enable tracking of the child's location and capturing of data remotely such as temperature, Latitude and Longitude .To show the child's actual data with reference values. Enable sending of notification if the child is out of location or when the device realizes abnormal conditions/situations. Then, emergency notification will be sent to and display in the parents' mobile apps.Cloud computing means shared computing resources (networks, servers, storages, applications, services) are delivered as a service over the Internet from cloud to parent's. According to cloud is an interconnected network of servers providing services for people. With the help of cloud we store the entire location data.

Purpose: It assists parents to monitor their children remotely .In case situations happen, notifications will be sent to parents so that actions can be taken. Through this child safety can be ensured and crime rate will be reduced. Parent's concentrate to their works without worrying about their children

2.LITERATURE SURVEY:

2.1 Existing problem:

Paper 1:

The tracking system is used to track moving individuals and provide an instant timeline of position information for tracking analysis. People Tracking System in the crowd for Smart Cities is a mobile application that allows parents to monitor the location of their children in a crowded environment. Besides children, there are also elderly and disabled people, so the person responsible for them can use this application to track their location. The parents have the application in which they can track the location and on the other hand, the child or the old person or the disabled person has a device that contains the Global Positioning System chip. The main objective of this study is to design an application with the system that will help the parents to track their children to reduce the cases where the children or the other mentioned categories of people might get lost. The current solution to this problem is that the children first have a wearable wrist where they imprint the phone number of their parents so that if the child is lost, there is an office where the child is taken and taken care of until they contact the parents to come and pick up the child. The problem with the current way that it takes time and there is a risk that child will be lost or kidnapped before ever reaching for any help, so the new way is better to also prevent them from going far away or being lost for hours, so the recovery here will be quick unlike the regularly used way today. This goal will be achieved by systematic objectives, starting from studying the existing systems, planning, and analyzing, designing, and implementing, and finally testing the proposed system.

Paper 2:

Recently, all over the world, crime against children is increasing at higher rates and it is high time to offer safety support system for the children going to schools. This paper focuses on implementing children tracking system for every child attending school. However the existing systems are not powerful enough to prevent the crime against children since these systems give information about the children group and not about each child resulting in low assurance about their child safety to parents and also does not concentrate on sensing the cry of the child and intimating the same to its parents. The proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis. The child module includes ARM7 microcontroller (lpc 2378), Global positioning system (GPS), Global system for mobile communication (GSM), Voice playback circuit and the receiver module includes Android mobile device in parent's hand and the other as monitoring database in control room of the school. Finally, implementation results for the proposed system are provided in this paper.

2.2 References:

Paper 1: Designing and implementing the people tracking system in the crowded environment using mobile application for smart cities. The Society for Reliability Engineering, Quality and Operations Management (SREQOM), India and The Division of Operation and Maintenance, Lulea University of Technology, Sweden 2021

Paper 2: Proceedings of the 3rd International Conference on Integrated Intelligent Computing.Communication & Security (ICIIC 2021)IoT-based Child Security Monitoring System

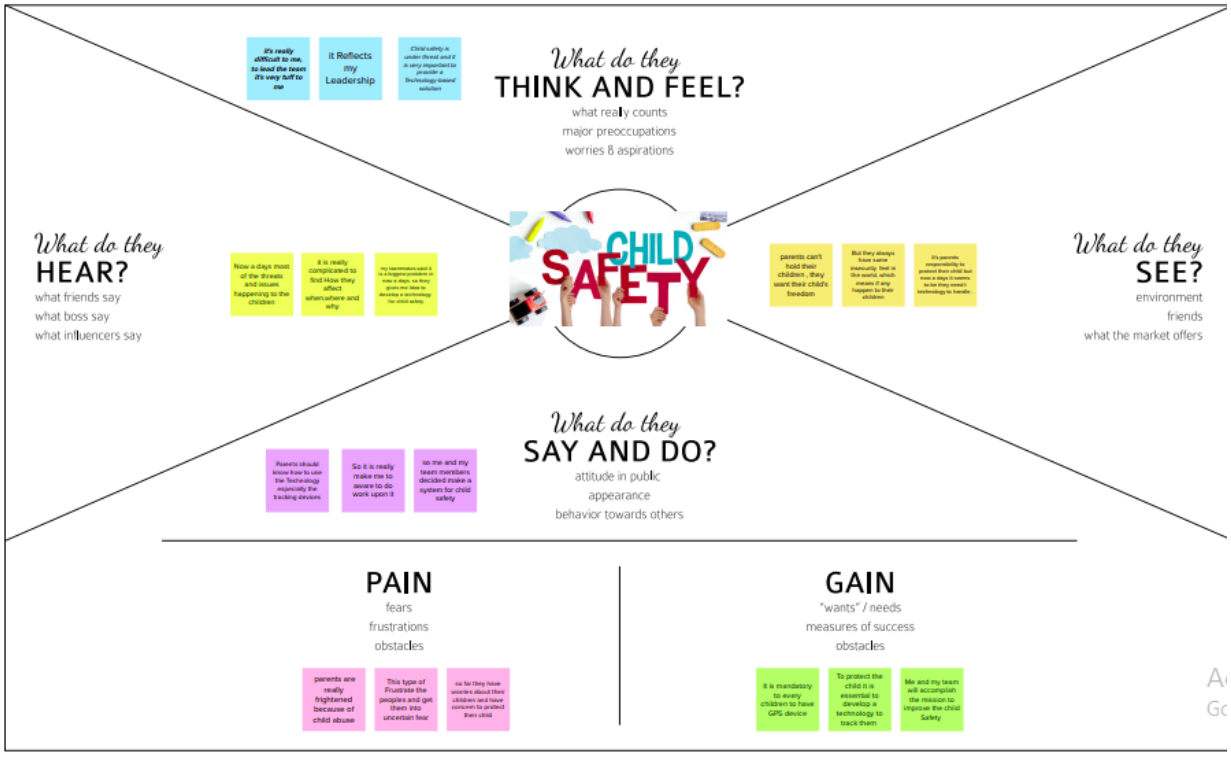
Paper 3: Design and Implementation of a Smart System for School Children Tracking

Paper 4: Design and Implementation of Children Tracking System using ARM7 on Android Mobile Terminals(September-2014)

Paper 5: Proceedings of the 3rd International Conference on Integrated Intelligent Computing Communication & Security (ICIIC 2021) -IOT-based Child Security Monitoring System

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



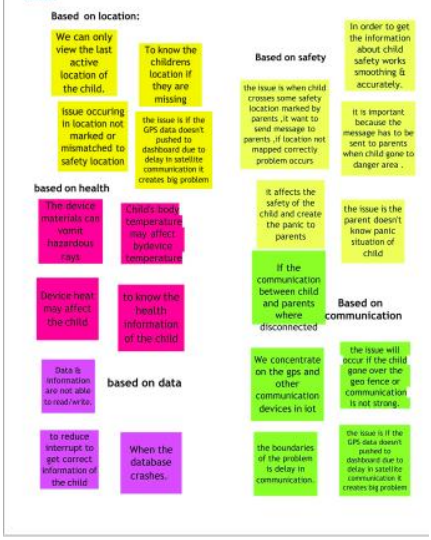
3.2 Ideation & Brainstorming

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you and break it up into smaller sub-groups.

20 minutes

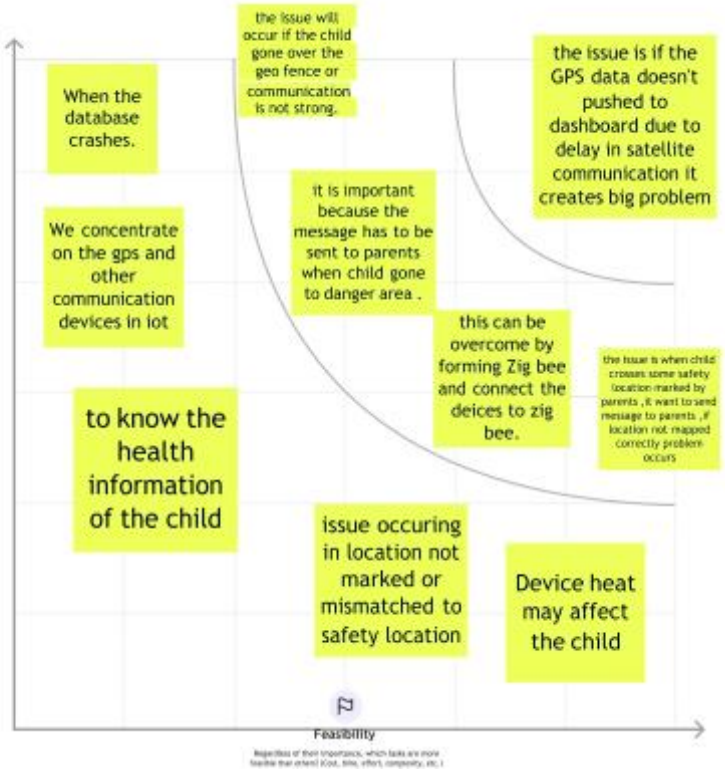


4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes

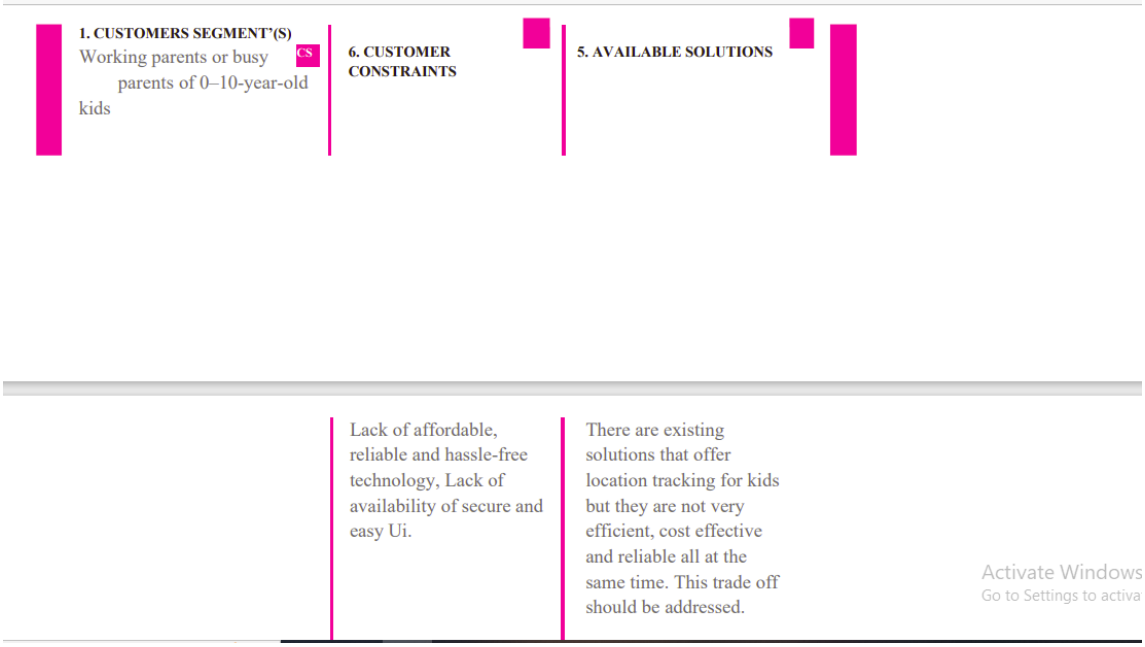


3.3 Proposed Solution

SI.NO.	Parameter	Description
1.	Problem Statement (Problem to be solved)	With the increasing rate of child kidnapping and trafficking and lack of tracking technology for child, there is limited application for child monitoring. Hence an **IoT based safety gadget** for child safety is probably the need of the hour today
2.	Idea / Solution description	A good solution to this issue would be to design a smart wearable Internet of Things sensor based device for monitoring the environment of a child along with a mechanism for tracking the child. The gadget will make use of **GPS and** a python script to publish the location details to the IBM IoT platform. The wearable also functions to send **immediate alerts** to the user through in case if the child crosses the geofence.
3.	Novelty / Uniqueness	All the existing systems make use of GPS and a mobile app to track and receive alerts regarding the child's location, while this system make use of the IBM Watson IOT Platform and IBM Cloud Services which is reliable and efficient to maintain the database of the child's location. The parent can set geofence and receive alerts through the web application which is user friendly and secure created using the Node Red Service. .

4.	Social Impact / Customer Satisfaction	The main concern of any parent would be the safety and security of their kids. The design of thismodel does not mandate a lot of technical knowledge from the user to operate and it is simple. The purpose of this device is to facilitate the guardian or parents in locating their child with ease and ensuring its wellbeing.
	Business Model (Revenue Model)	The target audience of this device is majorly the parents. Considering the Tracking ability of the device, **Hardware quality, used technology and sensors,** the starting range of price would go from Rs. 6000 and above. This type of wearable safety system is of utmost importance today and would be a must buy gadget in the market today.
6.	Scalability of the Solution	With the present needs for monitoring the child, the system is designed. It has a location database to maintain the entire location history of the child and the parent can set the geofence to determine the safer boundary of the child. . If there is a need for integrating additional sensors to improve accuracy, it can be done to make the system efficient in the long run.

3.4 Problem Solution fit



4. REQUIREMENT ANALYSIS

4.1 Functional requirement

Following are the functional requirements of the proposed solution.

FR-1	User Registration	✓ Registration through Gmail ✓ Registration through phone number
FR-2	User Confirmation	✓ Confirmation via Email ✓ Confirmation via OTP
FR-3	App installation	✓ Installation through link ✓ Installation through play store
FR-4	Settings geofence	✓ Setting by user to find child location
FR-5	Detecting child location	✓ Detecting location via app ✓ Detecting location via SMS
FR-6	User Interface	✓ User Login Form. ✓ Admin Login Form.

4.2 Non-Functional requirements

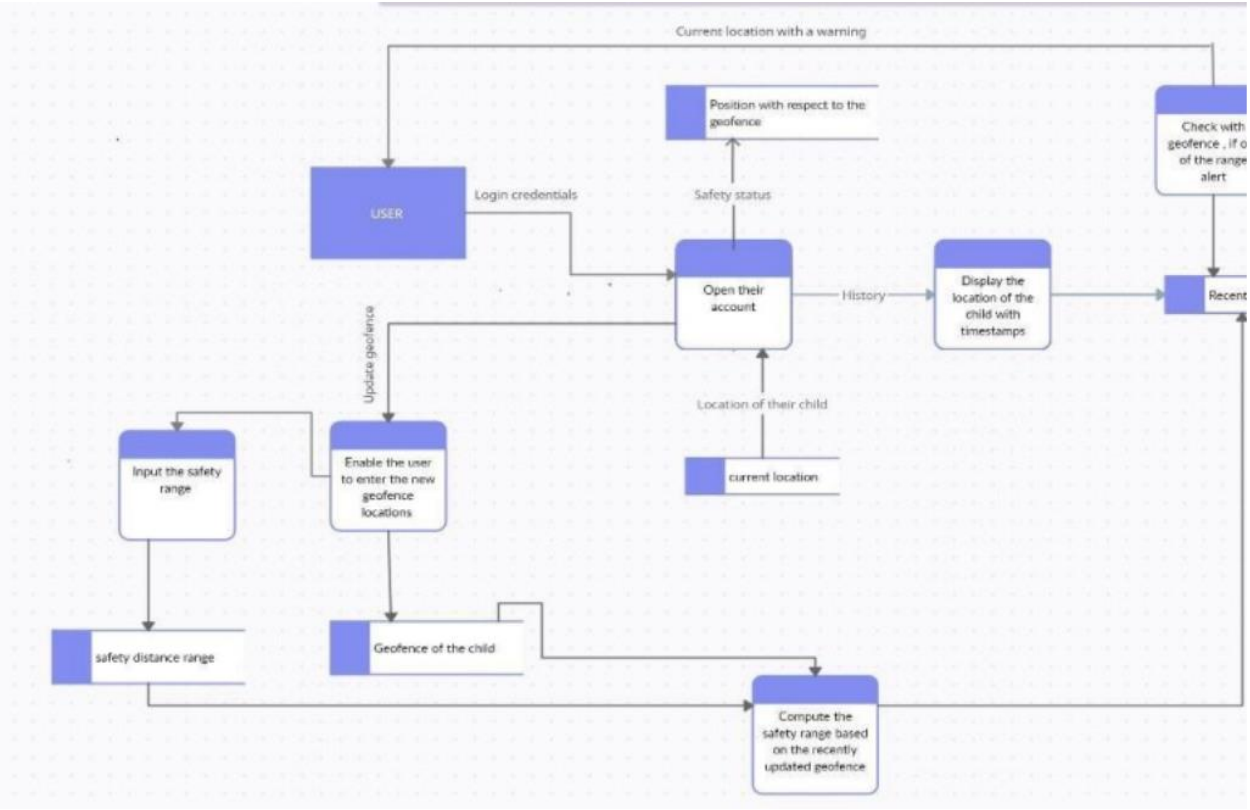
Following are the non-functional requirements of the proposed solution.

NFR-1	Usability	Device have GSM can help to inform the parents or relatives about the current situations of the child by deliver the message immediately to save the child.
NFR-2	Security	Makechildrenparents more assure abouttheir kid's security, we have a feature in our device called Geo-Fence. Whenever your child crosses that specificarea, you will get an instant notification on your phone.
NFR-3	Reliability	Portable Easy to use Flexibility
NFR-4	Performance	Create a Child tracker which helps the parents with 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.

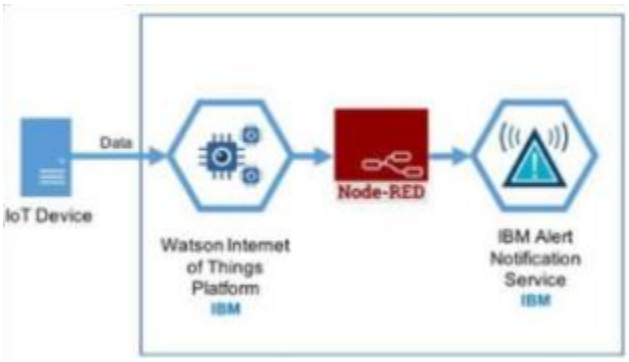
NFR-5	Availability	Track your child even in a crowd Get travel details of kids at any time Know the current location
NFR-6	Scalability	Gadget ensures the safety and tracking of the children. Parents need not worry about their children.
NFR-7	Evaluability	The system should be able to deliver promptly to the financing authority. In the case of non-profit organizations, the solution should be 'advancing the mission'.

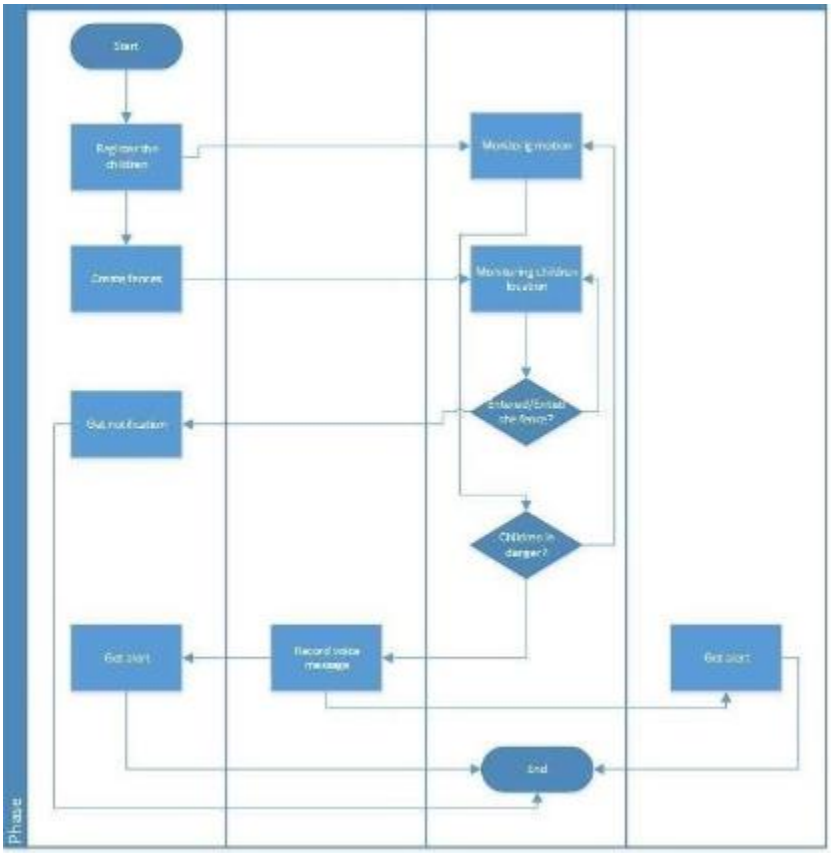
5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

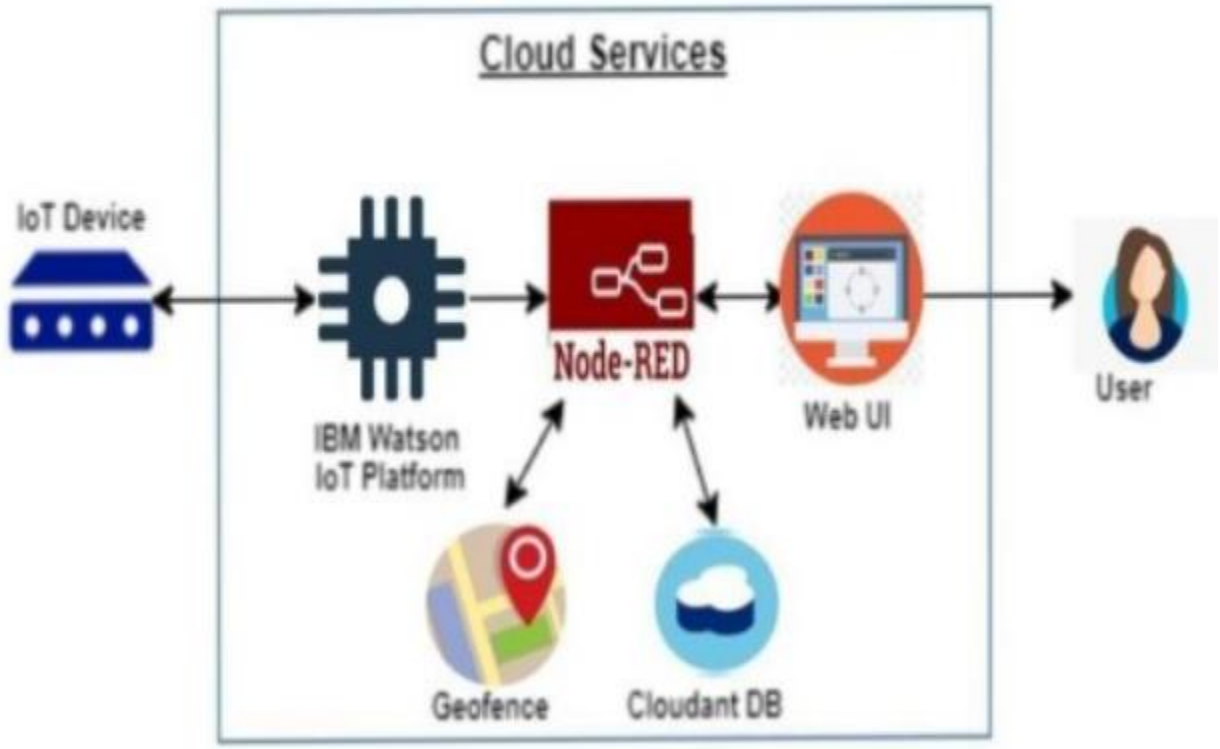




Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behavior, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

TECHNICAL ARCHITECTURE



5.3 User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user) and (Web user)	Registration	USN-1	As a user, I can register my account 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 myself	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through apple account	Icanregister& accessthe dashboardwith	High	Sprint-2

6.PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Prerequisites'

- IBM Cloud Services
- Software

Project Objectives

- Abstract
- Brainstorming

Create And Configure IBM Cloud Services

- Create IBM Watson Iot Platform and Device
- Create Node- Red Service
- Create A Database in Cloudant DB

Develop The Python Script

- Develop A Python Script

Develop A Web Application Using Node-RED Service.

- Develop The Web Application Using Node-RED

Ideation Phase

- Literature Survey On The Selected Project & Information Gathering
- Prepare Empathy Map
- Ideation

Project Design Phase -1

- Proposed Solution
- Prepare Solution Fit
- Solution Architecture

Project Design Phase -2

- Customer journey
- Functional Requirement
- Data Flow Diagram
- Technology Architecture

Project planning Phase

- Prepare Milestones & Activity List
- Sprint Delivery Plan

Project Development Phase

- Project Development-Delivery of Sprint-1
- Project Development-Delivery of Sprint-2
- Project Development-Delivery of Sprint-3
- Project Development-Delivery of Sprint-4

6.2 Sprint Delivery Schedule

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	1
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	1
Sprint-1		USN-3	As a user, I can register for the application through Gmail	2	Low	2
Sprint-1		USN-4	As a user, I can log into the application by entering email & password	2	Medium	2
Sprint-1	Login	USN-5	As a User, I can Navigate to the Dashboard after successfully Login to the Application.	1	High	3
Sprint-2	Support	USN-6	As a User, I can connect with Experts for clearing Queries and facing any Challenges by interact they can help to overcome that.	3	Medium	4
Sprint-3	Administrator	USN-7	As an Administrator, I can enter my Details as phone number, Gmail, and So on while Registration or Login Process. As an Administrator, I will Manage the Recycle Bin, Backup and Security. As an Administrator, I can Set the Geofence Location Limit. As an Administrator, I am able to View the Notifications from the Gadget.	3	High	4
Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**
Sprint-4	Project Kit Simulation (LED)	USN-8	As a User, I Can View the LED light glow and Blinks for Various Situation.	3	High	5

Sprint-4	Project Kit Simulation (Panic Button)	USN-9	As a User, I can Press the Button when I feel the Situation is Dangerous	3	High	5

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	14 Nov 2022

7. CODING & SOLUTIONING

7.1 Feature code 1

PYTHON CODE:

```
import time import sys

import ibmiotf.application import ibmiotf.device

#Provide your IBM Watson Device Credentials organization = "ie8mpi"

deviceType = "IoT_device" deviceId = "IoT_device_1" authMethod = "token" authToken =
"12345678”


def myCommandCallback(cmd): print("Command received: %s" %cmd.data)

        if cmd.data['command']=='motoron': print("MOTOR ON IS RECEIVED")


    elif cmd.data['command']=='motoroff': print("MOTOR OFF IS RECEIVED")


if cmd.command == "setInterval":



if 'interval' not in cmd.data:
                print("Error - command is missing required information: 'interval'")
else:
interval = cmd.data['interval']
    elif cmd.command == "print":    if 'message' not in cmd.data:
```

try:

else:

print("Error - command is missing required information: 'message'")

output=cmd.data['message'] print(output)

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:

deviceCli.commandCallback = myCommandCallback

Disconnect the device and application from the cloud deviceCli.disconnect()

8.TESTING:

8.1 Test case

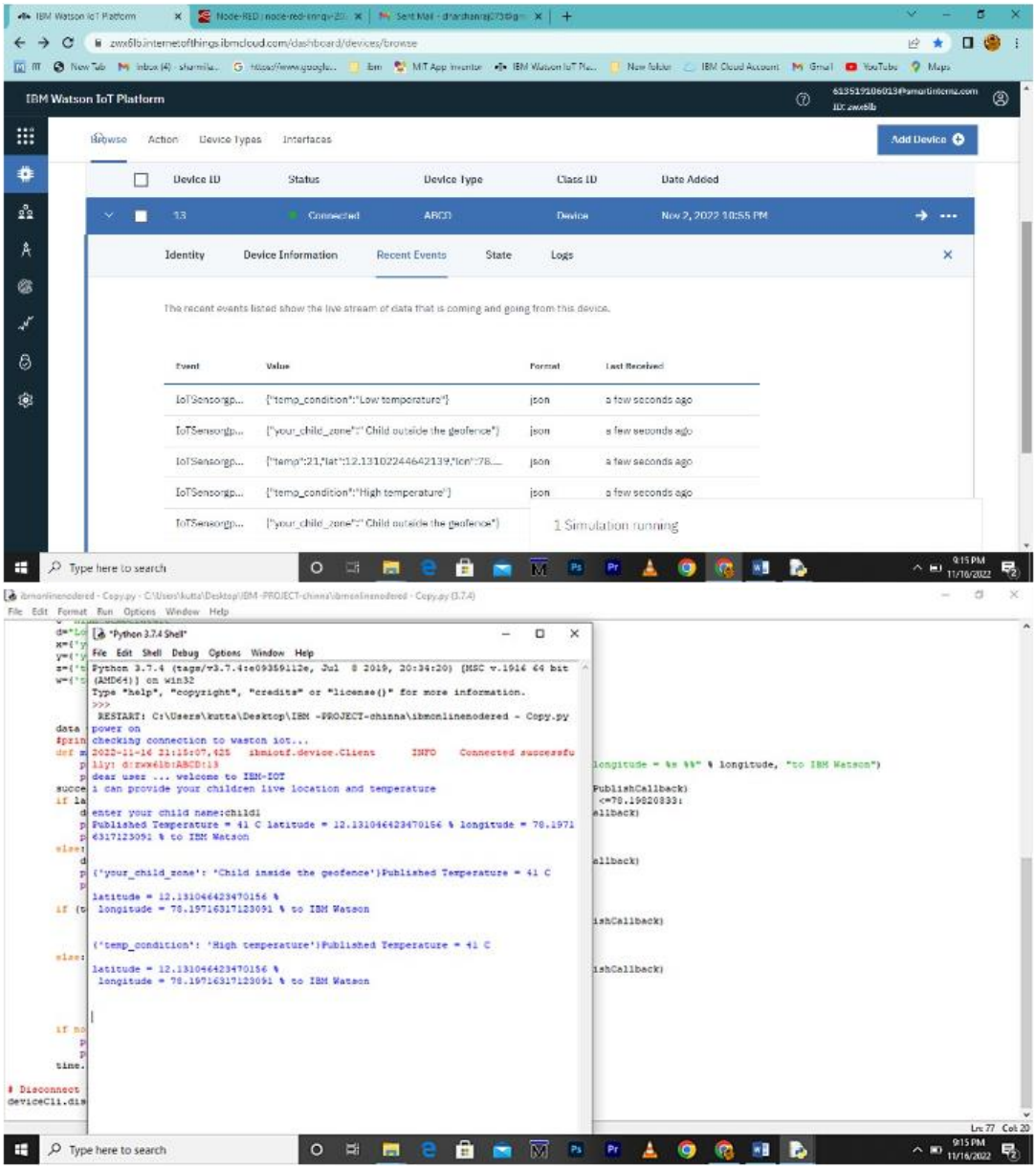
SL.NO	INPUT	OUTPUT	RESULT
01.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
02.	Latitude, Longitude Temperature	Inside the geofence, Temperature high	Passed
03.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed
04.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed

05.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
06.	Latitude, Longitude Temperature	Inside the geofence, Temperature high	Passed
07.	Latitude, Longitude Temperature	Outside the geofence,	Passed

		Temperature low	
08.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
09.	Latitude, Longitude Temperature	Inside the geofence, Temperature high	Passed
10.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
11.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
12.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed

13.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
14.	Latitude, Longitude Temperature	Inside the geofence, Temperature high	Passed
15.	Latitude, Longitude Temperature	Outside the geofence, Temperature high	Passed
16.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed
17.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
18.	Latitude, Longitude Temperature	Inside the geofence, Temperature high	Passed
19.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed
20.	Latitude, Longitude Temperature	Outside the geofence, Temperature high	Passed
21.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed

22.	Latitude, Longitude Temperature	Inside the geofence, Temperature high	Passed
23.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed
24.	Latitude, Longitude Temperature	Inside the geofence, Temperature low	Passed
25.	Latitude, Longitude Temperature	Outside the geofence, Temperature low	Passed


IBM Watson IoT Platform
Browse
Action
Device Types
Interfaces
Add Device
Device ID
Status
Device Type
Class ID
Date Added
13
Connected
ABCD
Device
Nov 2, 2022 10:55 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
IoTSensorgp...
{"temp_condition":"Low temperature"}
json
a few seconds ago
IoTSensorgp...
{"your_child_zone":" Child outside the geofence"}
json
a few seconds ago
IoTSensorgp...
{"temp":21,"lat":12.13102244642139,"lon":78....
json
a few seconds ago
IoTSensorgp...
{"temp_condition":"High temperature"}
json
a few seconds ago
IoTSensorgp...
{"your_child_zone":" Child outside the geofence"}
1 Simulation running
Type here to search
9:15 PM
11/16/2022

Python 3.7.4 Shell
File Edit Shell Debug Options Window Help
Python 3.7.4 (tags/v3.7.4:e09359112e, Jul 8 2019, 20:34:20) [MSC v.1916 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>>
RESTART: C:\Users\kutta\Desktop\IBM -PROJECT-chinna\ibmonlinenodered - Copy.py
power on
checking connection to waston iot...
2022-11-16 21:15:07,425 ibmiotf.device.Client INFO Connected successfu
l(y: d:rwx6lb:ABCD:13
dear user ... welcome to IBM-IOT
i can provide your children live location and temperature
enter your child name:child1
Published Temperature = 41 C latitude = 12.131046423470156 % longitude = 78.1971
6317123091 % to IBM Watson
{'your_child_zone': 'Child inside the geofence'}Published Temperature = 41 C
latitude = 12.131046423470156 %
longitude = 78.19716317123091 % to IBM Watson
{'temp_condition': 'High temperature'}Published Temperature = 41 C
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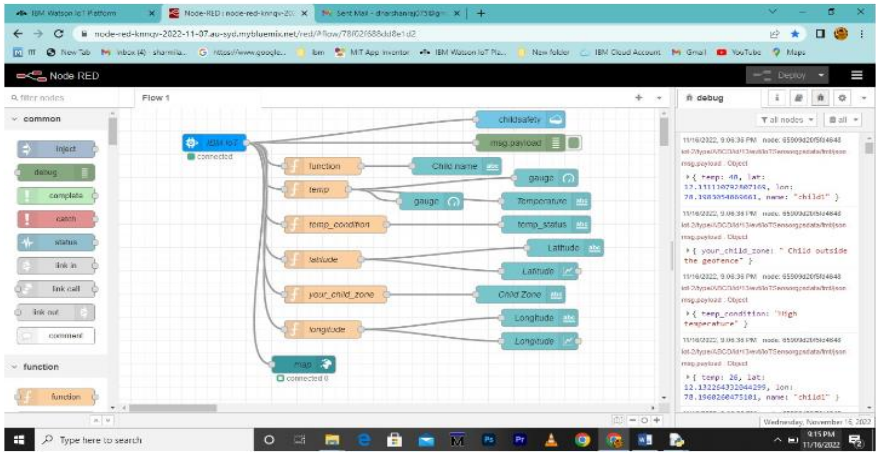
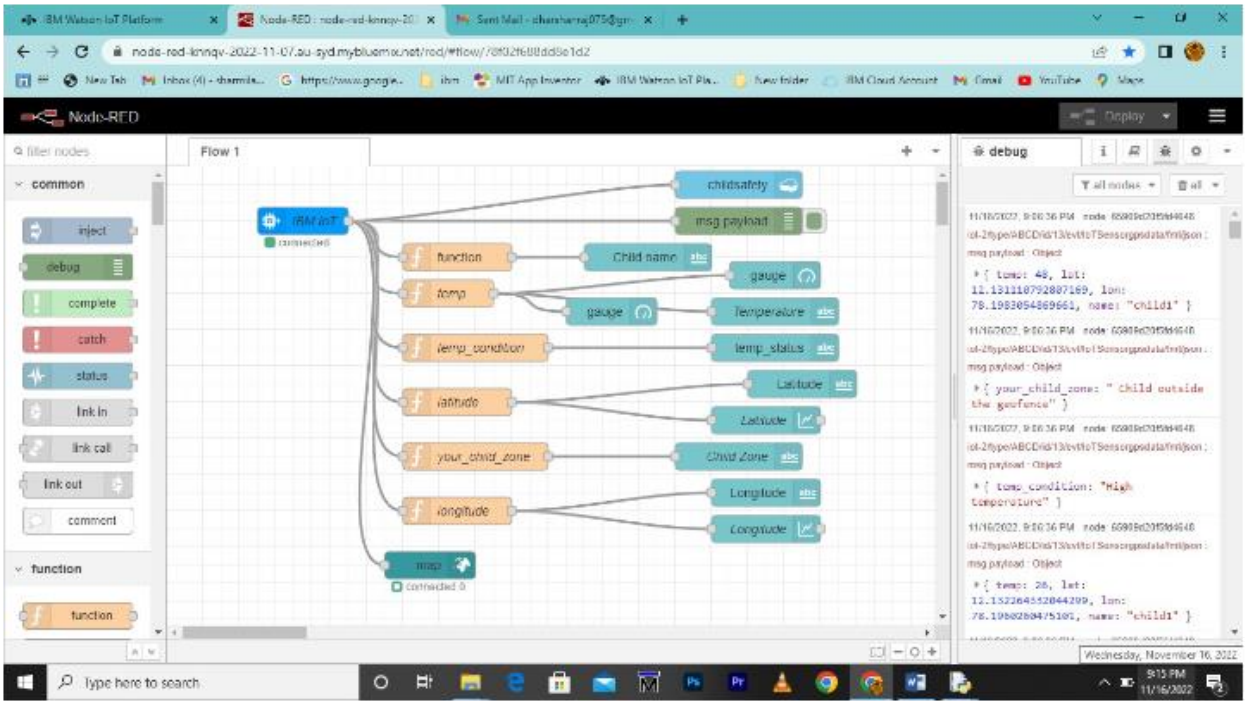
11/16/2022


Node RED
Flow 1
common
inject
debug
complete
catch
status
link in
link call
link out
comment
function
function
IBM IoT
connected
function
temp
temp_condition
latitude
your_child_zone
longitude
map
connected 0
childsafety
msg.payload
Child name
gauge
gauge
Temperature
temp_status
Lathude
Latitude
Child Zone
Longitude
Longitude
debug
all nodes
all
{ temp: 40, lat: 12.111110292467104, lon: 78.19830548866661, name: "child1" }
{ your_child_zone: " Child outside the geofence" }
{ temp_condition: "High temperature" }
{ temp: 26, lat: 12.132264332044299, lon: 78.19602604751101, name: "child1" }
Type here to search
9:15 PM
11/16/2022



8.2 User Acceptance Testing:

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).

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	5	3	2	3	13
Duplicate	1	0	0	0	1
External	2	2	0	1	5
Fixed	6	5	3	10	24
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	0	2	1	3
Totals	14	10	9	16	49

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	30	0	0	30
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:

9.1 Performance metrics

10. Advantages & Disadvantages

Advantages:

1. Save the life of the children.
2. Parent’s do their work peacefully without worrying about their children.
3. Continously monitoring the children.
4. Saves time.
5. Recovery of the children is easy,if the children lost.

Disadvantages:

1.Young Children may refuse to cooperate unless allowed to play with their gadgets

2.Easily misusing the device.

3.No water proof.

11.CONCLUSION:

The child tracking system that helps parents track the movements of children with the help of GPS technology. The entire location data is stored in database. This proposed app can shows the whether the children inside the geofence or outside the geofence to the parent's mobile . Even if the software is not running, the details are shown. It is because location access is available in the background and the software performs well on the mobile device. Based on the availability of the parent user, additional geofences may be required. Performance Requirements are summarized as follows: login, Location status, temperature ,Live on map etc. The system shall allow the user to create and/or log in to an account. The system shall allow the user to find the exact location of the children using GPS. The system shall allow the user to track the current location of the children using GPS.

12. FUTURE SCOPE:

1.Childs surrounding can be located with the help of accurate and precise real time loca-tion.

2.Surrounding environment temperature, SOS light along with Distress buzzers are provi-ded in this system.

3.If child crosses the geofence ,call goes to the registered mobile number’s.

4.This gadgets will be modified that has been suitable for all environments.

13.Apendix;

Github Link:

https://github.com/IBM-EPBL/IBM-Project-22074-1659803189