

Project Report

Team ID	PNT2022TMID04624
Project Name	IoT Based Safety Gadget for Child Safety Monitoring & Notification
Date	19 November 2022

1. INTRODUCTION

1.1 Project Overview

Child tracking system is an application that can track and monitor the child's location. The aim of the project is to create a system to allow the parents to keep track of their kids when their child is out of their sight. However, with the child tracking system the parent can track and monitor their child location in just a simple way when the parent is in office. A study on a few existing tracking systems have been done to gather the information and existing problems. Methodology applied in this project model. Data collection methods which are questionnaires and interviews also conducted to gather the user requirements and needs for the system. The results have been analyzed based on user responses. Most of the users (parents) agree and are looking forward to the system being implemented. The technology stack used in this project utilizes the might of cloud native applications. As the complete code and the base logic of the project is hosted using IBM cloud services, it is ensured that the project will be available all time online and available to every user in the vicinity.

Development of IoT based children monitoring in school will help parents to ease their worries. The system requirement for tracking the child and describing the implementation feature. To implement such a system a GPS with high accuracy is required, if the low accuracy GPS is used in this system,. System may give some error of that child location. In this system we send the message name TRACK to the device and the GPS of that device send the longitude and latitude to the GSM module , GSM module receive the information about longitude and latitude of that child location , further this message will be send to the user for tracking the location of that lost child. The Arduino is a small micro controller which is used for controlling the whole process in this system .This paper provides the concept for developing a low cost, high accuracy and user friendly system by using Google map. Google maps can improve the accuracy of GPS. This paper presents research that applies Google maps to describe the Child Tracking System. Improvements are proved by Google maps that make high accuracy.

Since we're using Google Maps instead of our own or any other third party map APIs, our feed will never be interrupted because of the immense support provided by Google. Also, we separately don't have to implement separate infrastructure to take care of the things that come with the maps implementation such as bugs and false location pings. These are the benefits of using Google Maps.

1.2 Purpose

People cannot predict or determine what will happen next to them in the next seconds. This is the same scenario as people cannot acknowledge when they will be targeted, but can make precautions to prevent it from happening. As for the great parents, their greatest concerns are their child, especially regarding the safety of the child. The parents start to take care of the child from birth. It is not possible for the parents to always stay beside them as most of the parents need to go for work to earn some money to sustain a family. Parents will start to feel anxious about their child's current status every second because they cannot see what their child is doing currently or what affairs will happen to them.

As clearly stated in the project overview, this project should provide the location data of the target all the time, as it is one of the principle objectives and a point of concern. The child safety gadget is concerned with limiting children's exposure to hazards and reducing children's risk of harm. The motivation behind this gadget is to enable guardians to find their kids without any difficulty in case of emergency situations or to know of any danger their children may be exposed to.

2. LITERATURE SURVEY

2.1 Existing problem

Safety for children has been on the rise at an unprecedented rate in recent years, with victims finding themselves in perilous situations with little chances of contacting their families. This project is mainly streamed towards a child safety solution by developing a gadget which can be tracked by its GPS location and also a panic button on the gadget is provided to alert the parent via GSM module calling for help.

To Track The device anytime a parental android app is developed. Smart gadget is always connected to the parental device and this device can receive and make phone calls and also receive SMS on gadget via GSM module and also a wireless technology is implemented on the device which is useful to bind the device within a region of monitoring range.

The proposed solution takes the location services provided by the GSM module. It allows the parents to get their child's current-location via SMS. A portable device which will have a pressure switch. As soon as an assailant is about to attack the person or when the person senses any insecurity from a stranger, he/she can then put pressure on the device by squeezing or compressing it. It presents the technological enablers and requirements for building a complete end-to-end energy efficient safety system. A wearable vest integrated wireless charging, designed to enhance the security of the children.

2.2 References

S.No.	Title	Authors	Abstract	Observation and Takeaway
1	Child Safety Monitoring System Based on IoT	N. Senthamilarasi, N.Divya Bharathi, D.Ezhilarasi, R.B.Sangavi	The overall percentage of child abuse filed nowadays in the world is about 80%, out of which 74% are girl children and the rest are boys. For every 40 seconds, a child goes missing in this world. Children are the backbone of one's nation, if the future of children was affected, it would impact the entire growth of that nation. Due to the abuse, the emotional and mental stability of the children gets affected which in turn ruins their career and future. These innocent children are not responsible for what happens to them. So, parents are responsible for taking care of their own children. But, due to economic conditions and aims 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.	In the proposed methodology, the authors highlight the usage of several different IoT components and limits to which they're useful. At the very core, the proposed system makes use of a GPS sensor to detect the accurate location of the child. Also, they use a webcam to capture the surrounding environment in which the child is present. For us, this looks like a far-fetched solution and the whole idea of using a webcam is not very data efficient.

2	A Comprehensive Smart IoT Tracker for the Children, Elder, and Luggage With the Assistance of Mobile App	<p>A. Z. M. Tahmidul Kabir, Al Mamun Mizan, Plabon Kumar Saha,</p> <p>Golam Kibria,</p> <p>Akib Jawad Ta-sin, Md Saniat Rahman Zishan.</p>	<p>This paper represents an IoT based tracking system, through which it is very easy to track the child, elder, or any type of luggage. This system has separate features for tracking each of these things, which have been completed by the IoT device and the Android app. It is possible to track anything manually or automatically with this device. NodeMCU, GPS, and GSM have been used as hardware to build the system, and Firebase Server and Google API services have been used for the Android app. Parcel exchange has become very common nowadays. With this system, in addition, the location of the parcel can be easily tracked, and administrative help can be taken for any unforeseen situation.</p>	<p>In this paper, along with the existing methods such as GPS and all, the authors implement the use of Android Apps to detect and track the child's location. While this method is effective to some extent, it may not be very data efficient and the app also looks more like a boilerplate one.</p>
3	Child Activity Monitoring using IoT	<p>Shikha Srivastava, Shubham Kumar Tiwari, Shruti Jha, Monika Singh.</p>	<p>Child care has become a significant challenge with the emerging modern work culture, where both men and women are ever occupied with their work schedules. On the other hand, digital technologies are revolutionizing our day-to-day activities and this technological advancement can also play a significant role in the field of child care. This research work intends to design and develop an IOT based child monitoring system to monitor the child from any location. The proposed system has been designed to identify any strange activity and send either text messages or snapshots of the child to the monitoring parent. The proposed Internet of Things (IoT) based child monitoring system is a well-organised low-cost system for real-time monitoring of the child. It allows parents to easily monitor their children by continuously tracking their activities.</p>	<p>The proposed methodology here not only tracks the child's location data but also their current doings. This uses ML algorithms to enhance and find the child's current activity using face detection. While this model has expanded scope, this may be kind of overkill. Also, the use of machine learning makes it not so data efficient.</p>

4	Design and Implementation of an IoT-based Kids Tracking System	Souad Kamel Mekni	Due to the increase of accidents that may affect children, there is a need for a robust system that enables real-time tracking of kids in the nursery school. With the emergence of internet of things (IoT) paradigms and the potential of Radio Frequency Identification (RFID), used extensively in many fields, developing such a system becomes feasible. In this paper, we propose a complete low-cost design and implementation of an IoT-based system that allows schools to track the movement of kids and to automatically take the attendance of kids and teachers during their presence in the nursery through RFID tags and a mobile application.	This methodology uses the RFID tag technology to track the location of the children. These RFID tags work on very specific situations such as when the child has a perfect time schedule and all the locations that come into the schedule have RFID enabled entrances or some point of entry and the ability to scan the RFID tags. While this implementation has a relatively lower cost than other proposed systems, this can work in only some specific situations.
5	IoT-Based Smart Band For Tracking Position And Monitoring Conditions Of Children	Lathifah Arief, Taufik Fadhlul Hadi, Tri A. Sundara.	Supervision of children on a 24-hour basis is not easy, with parents who are often busy always coming and going, making children often not always be supervised directly by parents. One way to always supervise the children directly is by making sure the child is always near the parents. But this method is not good because children need to establish a connection with the outside world and interact with other children. With the development of technology, a device is made to enable parents to monitor their children. This device is made along with the mobile application to display the information about the children and their situation by collecting data from the database, transmitted by the device.	This proposed system uses the combined advantage of IoT devices and a mobile application. While we've already seen this implementation, this one has some fault check mechanism built into it. As seen in the abstract, for any location data that it collects, it simultaneously collects the same data 5 times on a specific time interval to verify if the data collected is accurate and error-free. This one is the same on the hardware side, but has improved advantages on the software side.

2.3 Problem Statement Definition

More families are now spending time on work and social duties, hence away from their children. This causes increased concerns towards their safety and whereabouts, and has made keeping a track of their activities quite challenging.



Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	parent	Monitor my child	There is no proper device	It is not comfortable for handling	worried
PS-2	teacher	Monitor my students	There is no proper device	It is not comfortable for handling	worried

3. IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas

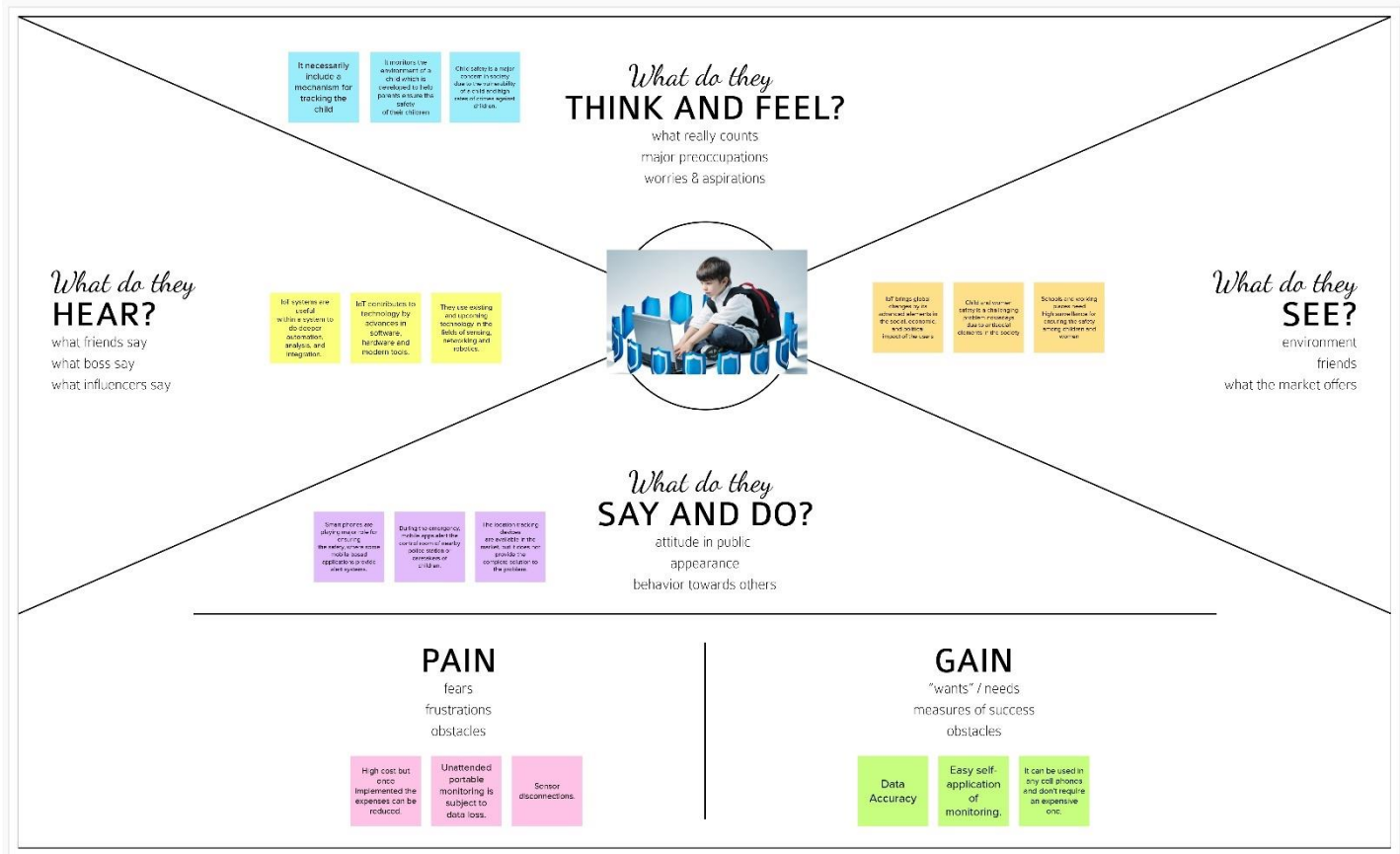
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Empathy Map Canvas

Gain insight and understanding on solving customer problems.

1

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



3.2 Ideation & Brainstorming

Step-1: Team Gathering, Collaboration and Select the Problem Statement

IoT or the internet of things is characterized as a forthcoming innovation that empowers us to create worldwide networked machines and also the devices that can be helped for exchanging of communication. As we all know that the realtime application has been increasing day by day, the smart connection also had increased. Rapid population growth, led to the increase in global life expectancy and the advance of technology, paving the pathway for the creation of agefriendly environments. This had led to the necessity in designing new products for infants protection. Infants or toddlers need parents' attention 24×7. In this present era, the cases regarding missing children have been increasing day by day, which was the main motivation that comes for the safety of little children. However, the parents cannot continuously monitor their babies' conditions either in normal or abnormal situations. Still, certain incidents like infant attacks have been reported, it is necessary to protect the baby.

Step-2: Brainstorm, Idea Listing and Grouping

In this present era, most of the wearable devices today are designed based on the location, activity, temperature, pressure, etc of the child and inform the parents via GPS. Therefore it is intended to use voice call as the way of communication between the parent mobile and child's wearable device. The system operates on the microcontroller board and the functions of sending and receiving notifications, calls, voice messages via GPS.

What is a child safety wearable device?

Wearable technology is designed explicitly to influence the fields of health and medicine, fitness, aging, disability, education, transportation, enterprise, finance, gaming, music, etc. The main aim of this technology is to smoothly enter the daily lives of individuals and become a functional part of them. Nowadays, we should be more concerned about the security of children. In our proposed system, this device helps parents to locate their children easily under missing conditions. At the present, there exist many wearables in the market which help track the daily activity of children and also help find the child using Wi-Fi and Bluetooth services present on the device.

Step-3: Idea Prioritization

Our proposed system is based on the Internet of Things-based Smart Child Safety Wearable Device System designed as an efficient and low-cost IoT based system for monitoring infants in real-time. This system plays a key role in providing better care for the lost children until they reconvene with the parents. The system architecture of the wearable is controlled by an AT -atmega328p microcontroller with an Arduino Uno bootloader. The Arduino Uno receives various types of data from the different modules interfaced to it, such as the GPS module upon being triggered by the Arduino GSM shield. The GSM shield function as an interface to transmit the data received by the Arduino Uno via SMS or MMS to a smartphone over GSM/GPRS. The GSM shield functions as a trigger for the Arduino Uno to request data from its various modules.

3.3 Proposed Solution

S. No.	Parameter	Description
1	Problem Statement	The world is becoming unsafe today. Lots of reasons are prevailing for a child to go missing. Child trafficking, child labour are few reasons. So, the responsibility for the parents to take care of their children has increased. This can be overcome by taking the aid of technology. So, developing an app which can show the live location of a child any time to parents/guardian mobile. To alert the parents when they get out of their Geofence.
2	Idea / Solution description	A Smart IoT device for tracking is developed to aid parents to detect and keep an eye on their children. In this project, we are going to develop a wearable safety gadget to display the live location of a child at any time on the parent's mobile to ensure their safety. A panic button in which the child can press during danger. Proper alert is given to the parents, guardians.
3	Novelty / Uniqueness	Our System offers a GPS tracking and wearable device to get information about the location and an immediate notification to parents, guardians, etc. The IoT device is also efficient and faster in communication as the device always synced with the mobile phone. This gadget has a lot of secondary features.
4	Social Impact / Customer Satisfaction	The device guarantees the child safety through constant monitoring via mobile phones, thus reducing the safety concern among the parents. It reduces the risk of the child during emergency situations as the device notifies immediately to the parent when unexpected events happen. Thus, the action is taken immediately, and the child is protected from further danger. It will be very helpful to parents who are busy workers not having time to watch over their children, and easy to operate so anyone can handle it.

5	Business Model (Revenue Model)	<p>The Most desired in the contemporary market, as kids need more protection in the current times. The gadget can be acquired at an affordable rate. Our gadget possesses a lot of ingenious attributes, and it will be accessible and beneficial to everyone. It is a device with numerous subscriptions for tracing and notification assistance.</p> <p>Our system provides a futuristic framework in such a way that new technologies in the market that align with our system can be readily adopted, adding more profit from a revenue standpoint, and offering multiple benefits at a viable cost from a user standpoint.</p> <p>As devices are at low costs, the awareness of the device will be spread among the entire society creating an impact. This increases the number of users hence the profit also increases, as the number of users is directly proportional to the profit of the manufacturer.</p>
6	Scalability of the Solution	<p>This methodology can be further enhanced by the installation of the mini camera inside a smart gadget for exemplary security and protection so that a glimpse can be caught on the live footage on the parental phone during panic circumstances. It is a portable system and requires less maintenance.</p> <p>It is more efficient and is available at reasonable prices.</p>

3.4 Problem Solution fit

Problem-Solution fit canvas 2.0		Purpose / Vision	
Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS Who is your customer? i.e. working parents of 0-5 y.o. kids This project aids the parents to track the daily activity and location of their children	6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. 1. Network Connection 2. Battery consumption 3. Cost of the device	5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking In previous methods, parents had to give awarness to their children for safety, but now with the device they can feel at peace than ever.
	2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one, explore different sides The main focus of the project is to provide the information/location of the child to the parents all times, so they are under constant monitoring and safe from child abductors	9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. Child abductors are the main root cause as they try to kidnap children from parents to get ransom for their personal benefit. Hence actions must be taken to prevent this.	7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace) Aside from just tracking your child on a certain distance, it also triggers an alert when it leaves a set contrainrt distance for example as school. This way the parent is alerted even when he is not looking at the location of their child at all times.
Focus on J&P, tap into BE, understand RC	3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. The device allows you to track your child or alert you when they leave a certain threshold limit.	10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. Our solution is to protect and monitor the child at all times when the device is turned on. If any deviant readings are disclosed by the sensors, then an alert is sent to parent's mobile immediately.	8. CHANNELS of BEHAVIOUR CH 8.1 ONLINE What kind of actions do customers take online? Extract online channels from #7 Parents look to digital solutions more than ever to support and protect their child. Hence our mobile app does just that. 8.2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. If the parents log out og the app, it displays the last known information about the child.
	4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure > confident, in control - use it in your communication strategy & design. Parents are very much confident and feel at peace after using the device as they can always monitor their child.		
Identify strong TR & EM			Extract online & offline CH of BE

4. REQUIREMENT ANALYSIS

4.1 Functional requirements

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through message Registration through website Registration through App

FR-2	User Confirmation	Confirmation via Email Confirmation via OTP Confirmation via Call
FR-3	App Installation	Installation through QR Link on Device Installation through Play Store/App Store
FR-4	Detecting Child Location	Detecting location via app Detecting location via SMS Detecting location through Website
FR-5	Database	Location information is stored in the cloud dynamically Values include distance, latitude, longitude
FR-6	User Interface	User Emergency Contact List User login form Admin login form
FR-7	User Notification	Notification through Mobile Notification through Gmail

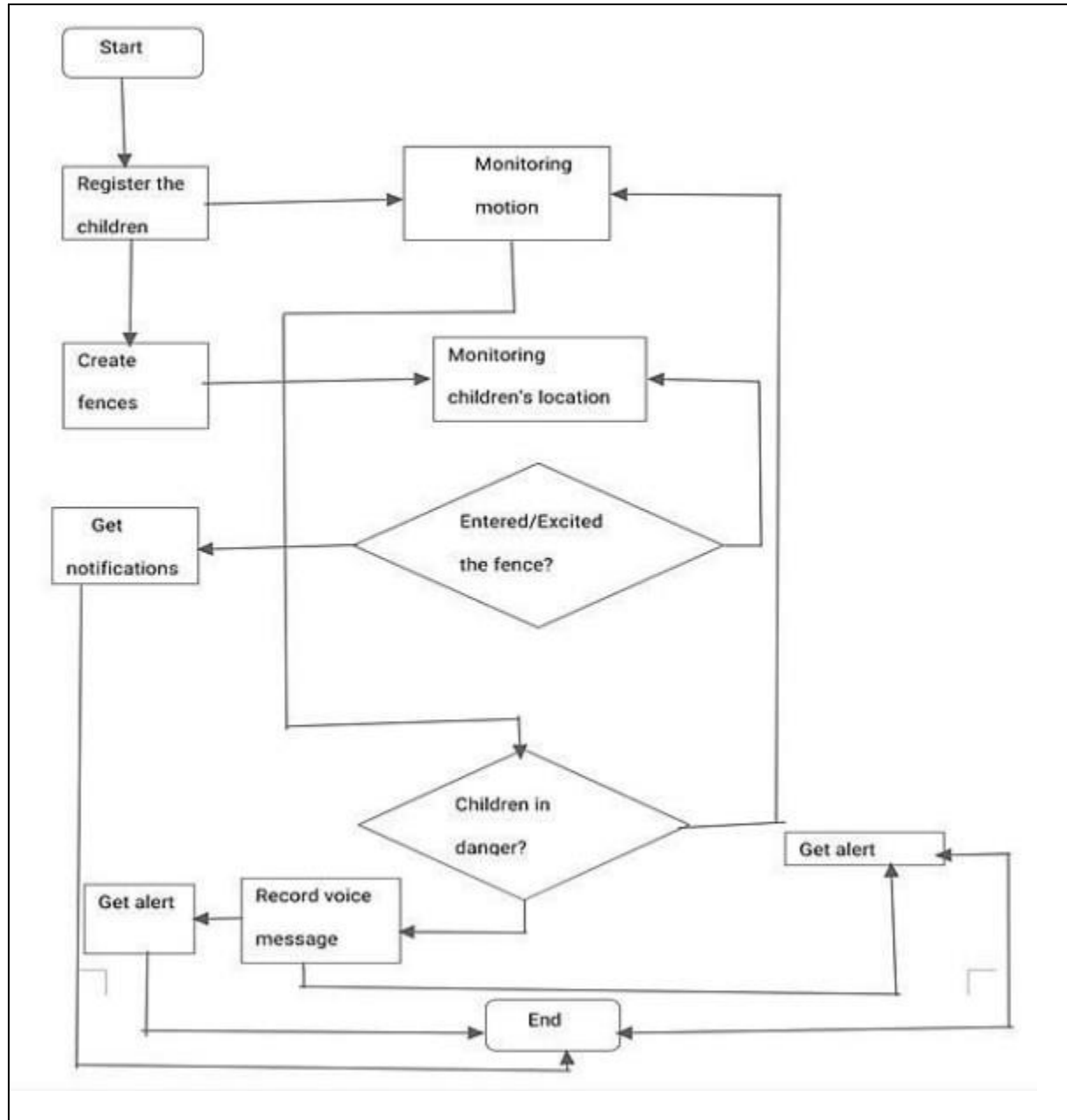
4.2 Non-Functional requirements

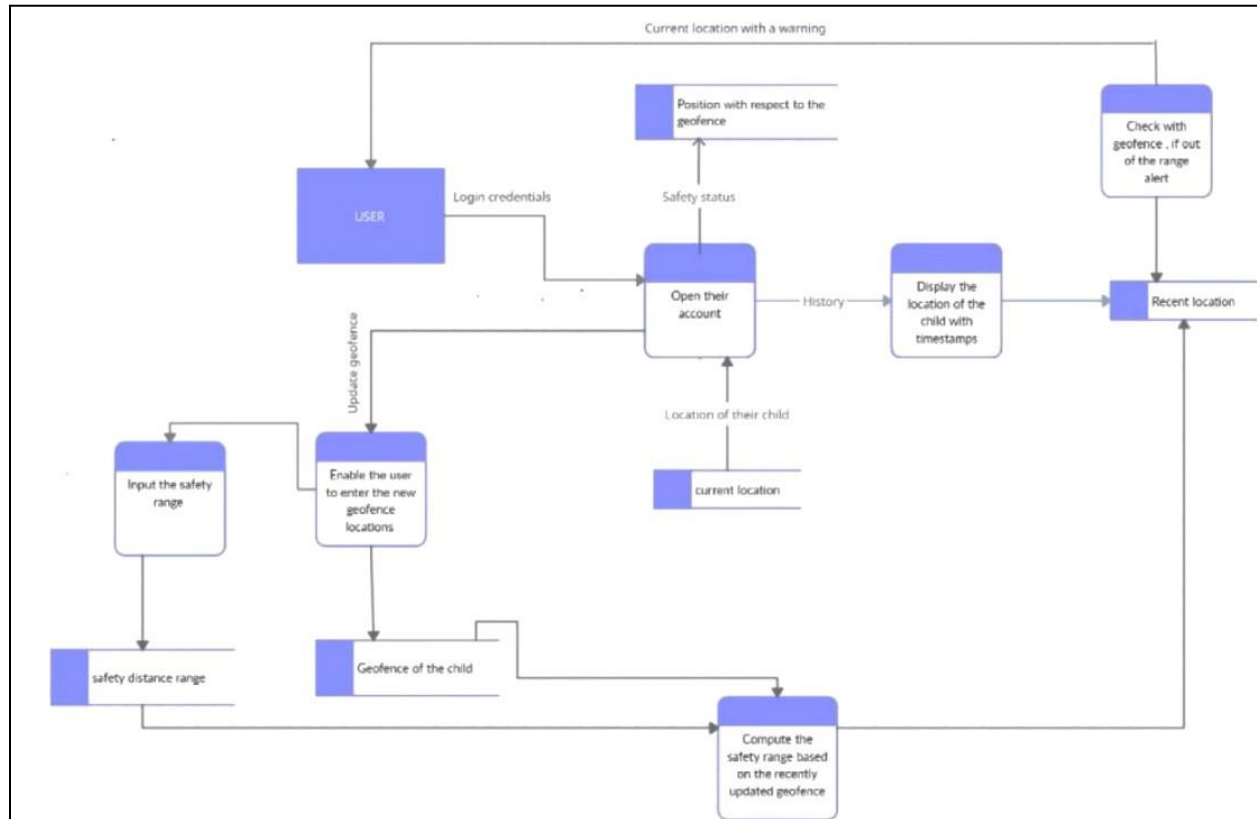
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	<p>A simple device which works with the mobile app that sends Emergency notification to parents.</p> <p>The IOT device has a GSM module that helps inform parents about the current location of their kids.</p> <p>This device can easily be controlled and operated by parents effortlessly.</p>
NFR-2	Security	<p>The main aim of the device is to build a safer environment for kids to spend more time outside.</p> <p>There is a guaranteed assurance to parents that their children are safer with their gadget.</p>
NFR-3	Reliability	<p>The device is transportable, easy to use and also tensile.</p> <p>The data from the GPS module is highly reliable which is stored in the cloud, which helps the parents to monitor their child with ease.</p>

NFR-4	Performance	<p>The performance of the device should be very consistent, that is the location of the child should be updated every 5 seconds or less.</p> <p>The objective of the system is that it spontaneously alerts the parents by sending a notification or an SMS when the child crosses a threshold distance or in crisis.</p> <p>A more advanced GSM module is required to continuously send the GPS data to the cloud even in a less network connectivity area.</p>
NFR-5	Availability	<p>The device is used to keep track of the child everywhere in the city.</p> <p>The child's live location is updated constantly in the parent's mobile app which ensures reliability.</p> <p>The parents just need to have a good internet connection for the tracking purpose.</p>
NFR-6	Scalability	<p>The device can be further enhanced or scaled to a higher level by installation of a small camera inside it, providing extra protection as the parents can see the live feed but this will require more power.</p> <p>Improved and advanced GSM and GPS modules can be used to detect the location more precisely and send data at faster speeds.</p>

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:

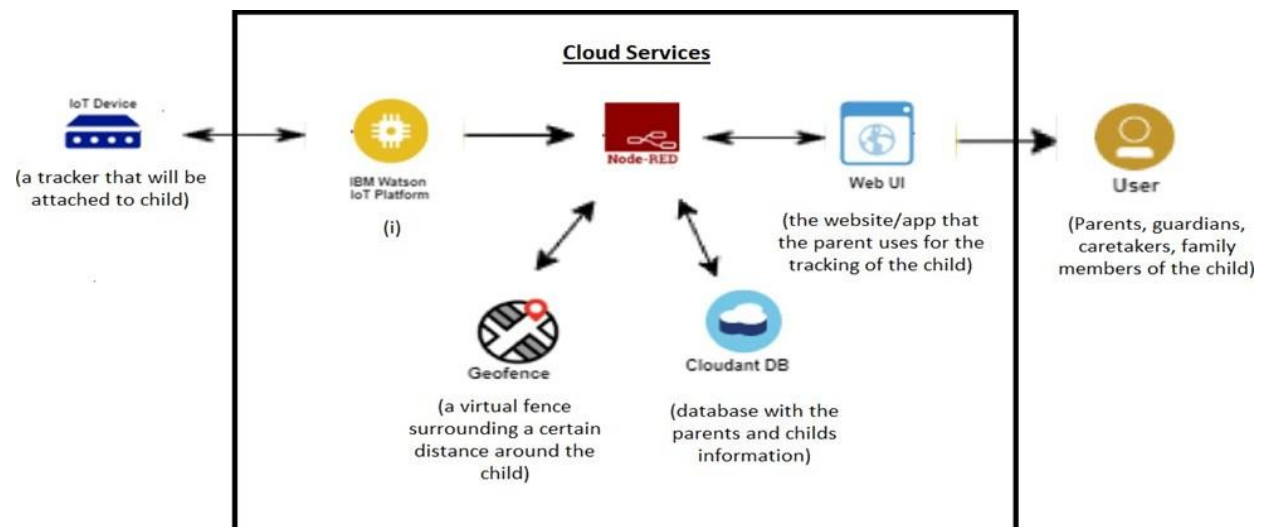
- In the existing system, manual intervention is required. But in the proposing system, we make every action autonomously.
- This is used to develop a wearable device for the safety and protection of women and girls. This objective is achieved by the analysis of physiological signals in conjunction with body position. The physiological signals that are analyzed are galvanic skin resistance and body temperature. Body position is determined by acquiring raw accelerometer data from a triple axis accelerometer.

Design:

All the requisites are used to draft the Application. The layout and architecture of the software is done in a distinctive approach so the software can be employed and developed imminently. The Arduino acquires the region from the GPS equipment and consigns it to the cloud to inspect if the end user is within the confined zone. If the user is further away from the confined zone, an alert is sent to the cataloged mobile through the cloud. When the requisition is opened, the locality is obtained from the cloud and unveiled on the mobile.

Implementation:

The implementation mechanism is done and execution is terminated by progressing the logic by coding. All the vital packages are imported and for each router specific logic is developed in accordance to the usage. Development of a safety device for kids to guarantee their security in the absence of an understated examination of their parents.



5.3 User Stories

User Type	Functional Requirement	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile 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 & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with a Gmail account Login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can receive a Verification Mail and Verify It.	High	Sprint-1
	Dashboard	USN-6	As a User, I can Navigate to the Dashboard after successfully Login to the Application.	I can view the locations which are stored in the database and other features available on the Platform via the dashboard	High	Sprint-2

Customer (Web user)	Notification	USN-7	As a user when there is an alarming situation with the child, a notification will be received through the application	An alert message is sent to the parent's mobile and received if the user is engaged in the application.	High	Sprint-1
Customer Care Executive	Support	USN-8	As a User, I can contact experts to clear doubts, they assist to overcome challenges by checking for any glitches and monitoring the operation and by checking if all the users are authorized.	I can login with my given credentials to chat/call them and get clarity about any intricacies.	Medium	Sprint - 3
Administrat or	Login	USN-9	As an Administrator, I can set the Geofence Location Limit and make sure the database encompassing the locations is secure, factual and updated constantly	I can log in with my provided credentials and can exploit the prospects Open on the Dashboard	High	Sprint - 3
	Access	USN-10	When there are issues in accessing both the device (connection of both parent's & child's device)	Admin/Device Operator's advice should be followed	Medium	Sprint-1
	Security	USN-11	Maintaining and making sure the database containing the locations are secure and accurate and updated constantly.	I can login only with my provided credentials	High	Sprint-3

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	User Registration	USN-1	Registration through website Registration through app	2	High	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T
Sprint-1	User Confirmation	USN-2	Confirmation via Email Confirmation via OTP	1	High	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T
Sprint-2	User login	USN-3	Setting up User Id and password	2	Low	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T
Sprint-1	App permission	USN-4	Grant the permission for the app to access location, contact etc..	2	Medium	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T

Sprint-1	Interface with the Device	USN-5	Connecting the device with the registered app with the device ID.	1	High	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-2	Setting Geo-location	USN-6	Creating the Geo-location area in the map	2	Low	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T
Sprint-3	Database	USN-7	Location history is stored in the cloud. Can be accessed from the dashboard.	2	High	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T

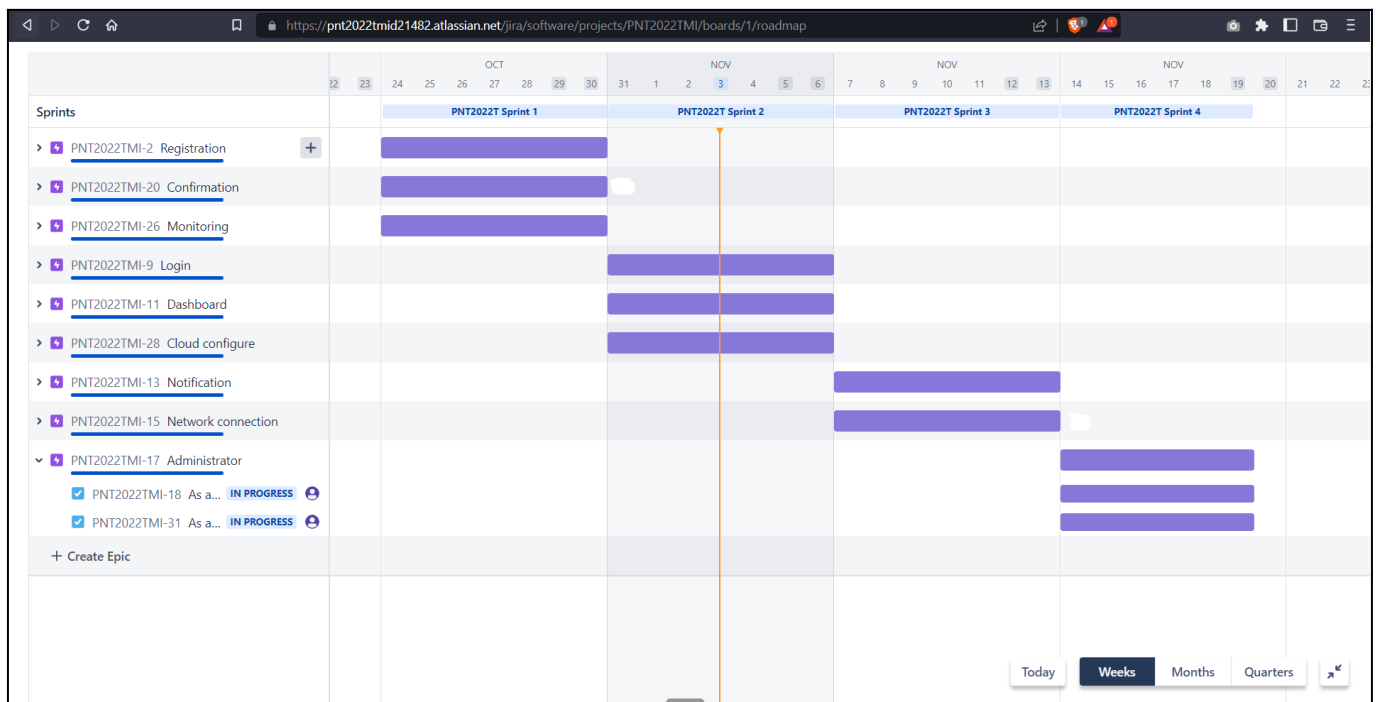
Sprint-4	Tracking location	USN-8	Tracking the location through app. Tracking thelocation through website.	2	High	Lydia S Kishore S K Krishna N Harish Prabu P N Gokul T
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6.2 Sprint Delivery Schedule

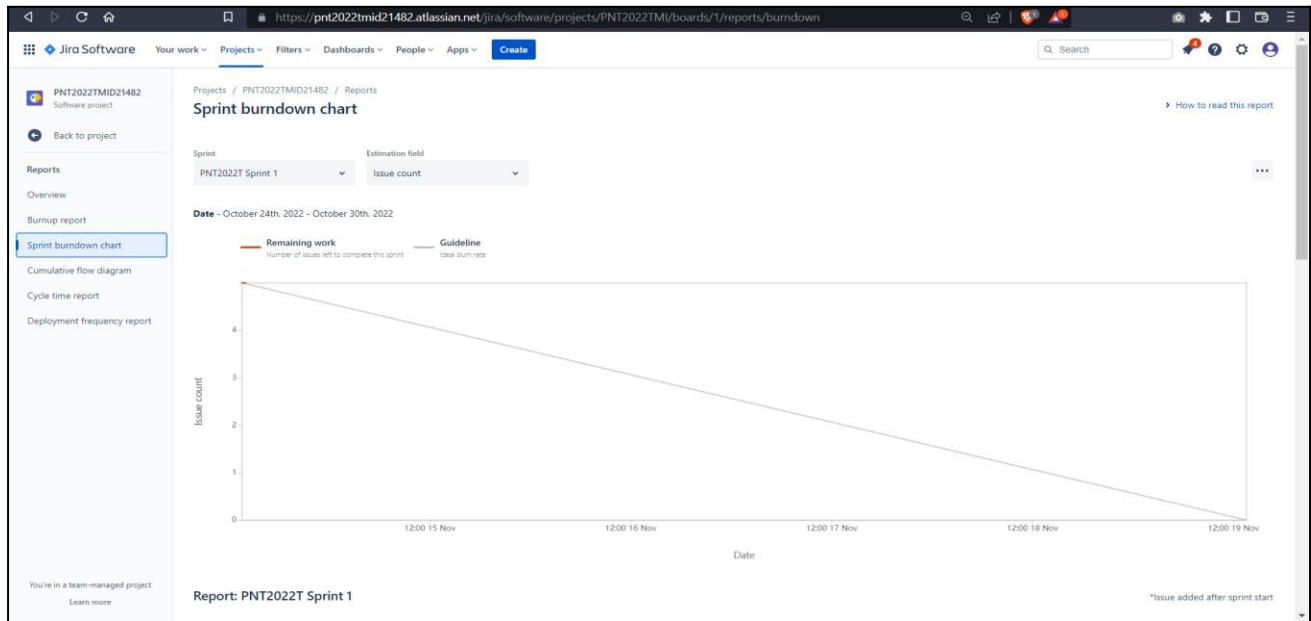
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	31 Oct 2022
Sprint-3	20	6 Days	07 Nov 2022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

6.3 Reports from JIRA

Road Map:



Burndown chart:



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

7.1 Feature 1 - Registration

The screenshot shows a registration form titled "Register". The form is displayed on a dark background. The form fields are:

- UserName
- Password
- Email
- Number Of Childrens
- Latitude
- Longitude
- ☐ Remember

At the bottom of the form are two buttons: "SUBMIT" and "CANCEL".

Register

Register

UserName

dayaanand

Password

Email

daya@student.tce.edu

Number Of Childrens

1

Latitude

9.9252

Longitude

78.1198

☒ Remember

SUBMIT

CANCEL

Register

Register

UserName

dayaanand

Password

Email

Please fill out this field.

Number Of Childrens

Latitude

Longitude

☐ Remember

SUBMIT

CANCEL

userregistration

Document ID

Options

JSON

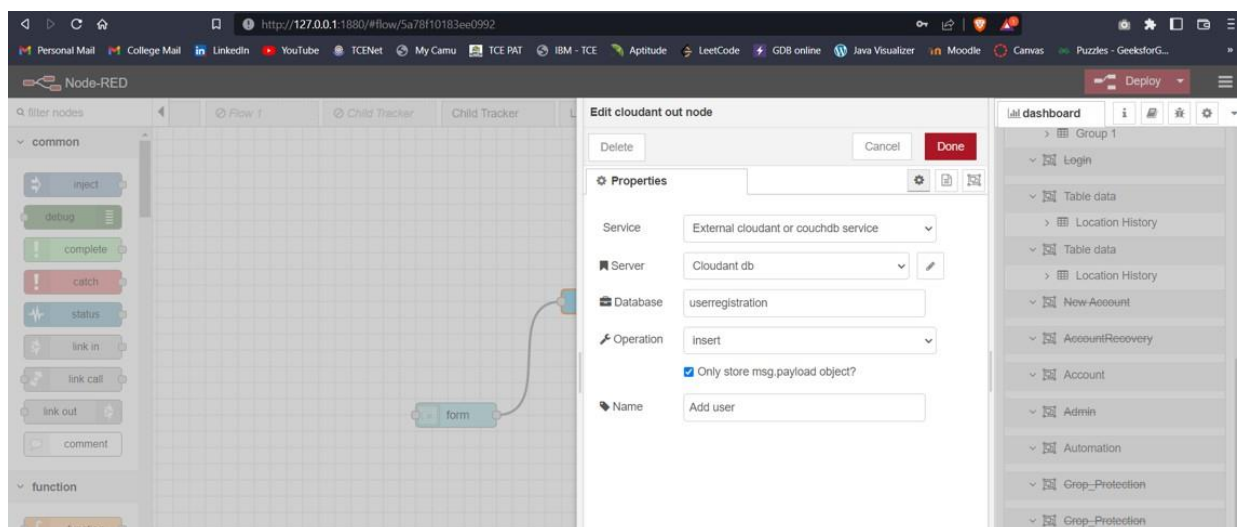
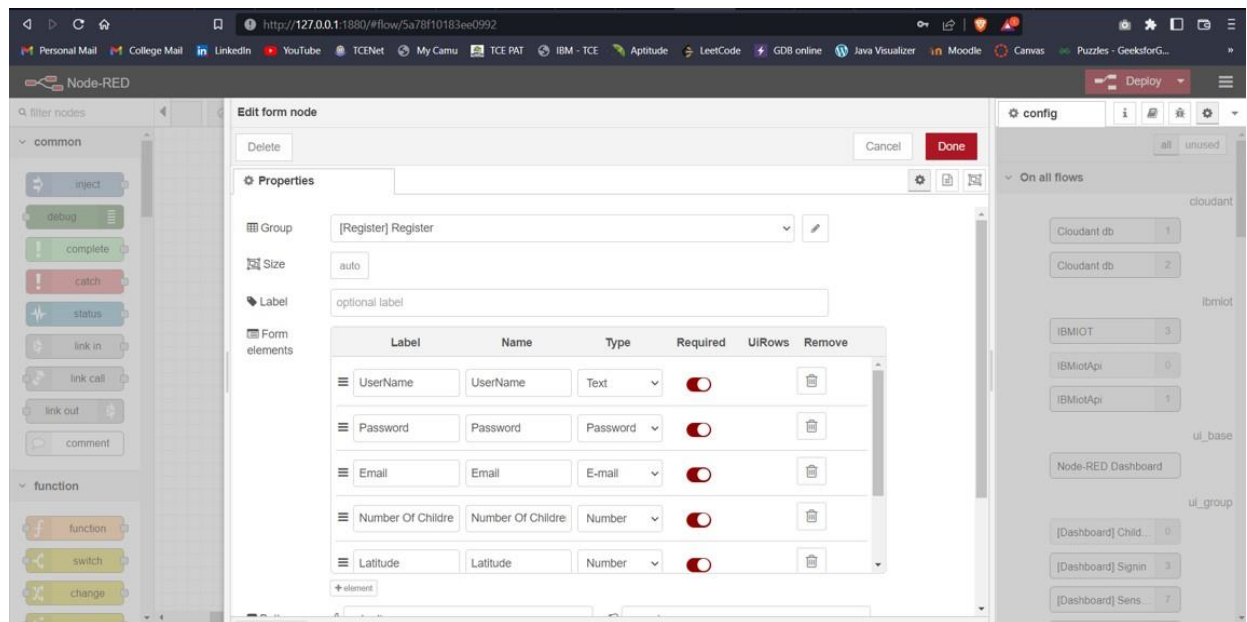
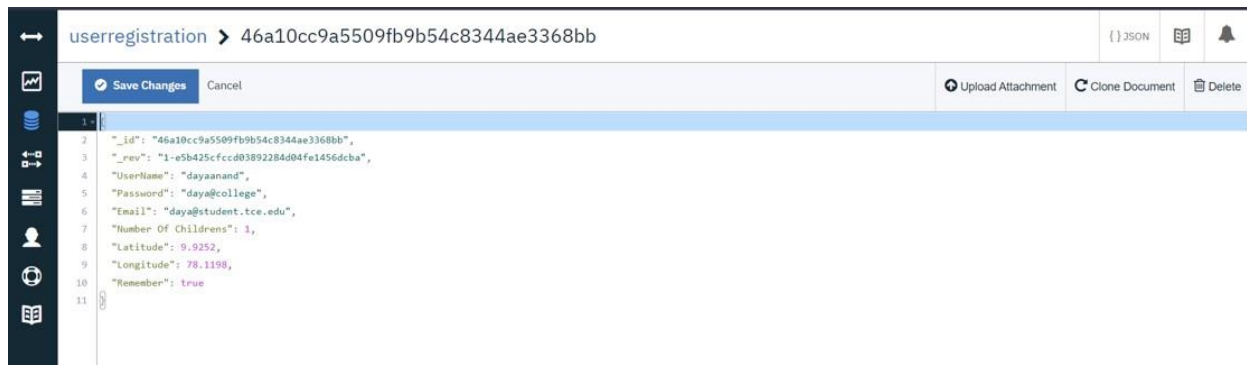
Create Document

Table

Metadata

JSON

	Email	Latitude	Longitude	Number Of Ch	Password
<input type="checkbox"/>	daya@student.tce.edu	9.9252	78.1198	1	daya@college
<input type="checkbox"/>	tarunksu30@gmail.com	2	2	2	tarun
<input type="checkbox"/>	dayaanand187@gmail.com	2	2	2	daya



7.2 Login

Dashboard

Signin

username
dayaanand

password

SUBMIT

CANCEL

Dashboard

Signin

username

password

SUBMIT

CANCEL

Authentication Failed

Username Doesn't exist!!!

OK

Dashboard

Signin

username

password

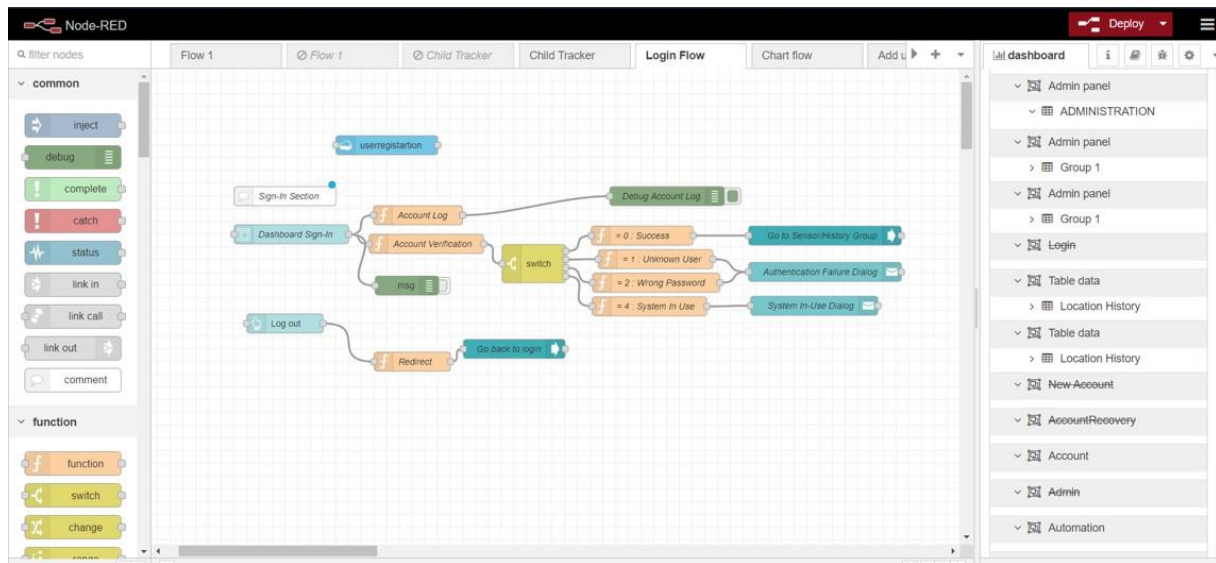
SUBMIT

CANCEL

Authentication Failed

Invalid Password

OK



Node-RED interface showing the "Edit form node" dialog. The form is titled "[Dashboard] Signin". It has a size of "auto" and a label of "optional label". The form elements table shows two fields: "username" (Text, Required) and "password" (Password, Required).

Label	Name	Type	Required	UIRows	Remove
username	username	Text	<input checked="" type="checkbox"/>		
password	password	Password	<input checked="" type="checkbox"/>		

Node-RED interface showing the "Edit function node" dialog. The function is titled "Account Log". The code in the "On Message" tab is as follows:

```
1 var accountlog = flow.get("accountlog") || [] ;
2
3 accountlog.push({ accessAt : new Date(), username : msg.payload
4
5 flow.set("accountlog", accountlog);
6
7 msg.payload = accountlog;
8 return msg;
```

Node-RED interface showing a flow with nodes: inject, debug, complete, catch, status, link in, link call, link out, comment, function, switch, change, and a function node named "Account Verification". The function node code is as follows:

```
1 var accounts = flow.get("accounts") || [ { username : "admin" } ];
2
3 var username = msg.payload.username ;
4 var password = msg.payload.password ;
5
6 msg.payload = 1;
7
8 accounts.forEach(function ( account ){
9   if ( account.username == username ) {
10     msg.payload = 2;
11     if ( account.password == password ) {
12       msg.payload = 0;
13     }
14   }
15 });
16
17 if ( msg.payload == 0 ) {
18   var currentsocketid = flow.get("clientid") || undefined;
19   if ( currentsocketid != undefined && currentsocketid != msg
20 }
```

The dashboard on the right shows a list of nodes: Admin panel, ADMINISTRATION, Group 1, Login, Table data, Location History, New-Account, AccountRecovery, Account, Admin, and Automation.

Node-RED interface showing a flow with nodes: inject, debug, complete, catch, status, link in, link call, link out, comment, function, switch, change, and a function node named "Redirect". The function node code is as follows:

```
1 var msg = {};
2
3 msg.socketid = flow.get("clientid") || undefined;
4 msg.payload = {
5   group: {
6     hide: ["Dashboard_SensorData"],
7     show: ["Dashboard_Signin"]
8   }
9 };
10
11 flow.set("clientid", undefined);
12 return msg;
```

The dashboard on the right shows a list of nodes: Admin panel, ADMINISTRATION, Group 1, Login, Table data, Location History, New-Account, AccountRecovery, Account, Admin, and Automation.

Node-RED interface showing a flow with nodes: inject, debug, complete, catch, status, link in, link call, link out, comment, function, switch, change, and a function node named "= 0 : Success". The function node code is as follows:

```
1 /* activate session timer */
2 var sessionTimer = flow.get("sessionTimer") || 0;
3 var curTime = Date.now();
4 flow.set("sessionTimer", curTime);
5 flow.set("clientid", msg.socketid);
6 /* ui-control payload */
7 msg.payload = { group: {
8   show: ["Dashboard_SensorData", "Another_History"],
9   hide : ["dashboard_signin"]
10 } };
11
12
13 return msg;
```

The dashboard on the right shows a list of nodes: Admin panel, ADMINISTRATION, Group 1, Login, Table data, Location History, New-Account, AccountRecovery, Account, Admin, and Automation.

Node-RED interface showing a flow diagram and the "Edit function node" panel.

Flow Diagram: The flow starts with a "Sign-In Section" node, which triggers a "Dashboard Sign-In" node. This node is connected to a "msg" node, which then triggers a "Log out" node. The "Log out" node is connected to a "Redirect" node.

Edit function node panel:

- Name:** = 1 : Unknown User
- Setup:** On Start, On Message, On Stop
- Code:**

```
1 msg.payload = "Username Doesn't exist!!!"
2 return msg;
```

Dashboard: The dashboard is titled "dashboard" and contains a list of nodes: Admin panel, ADMINISTRATION, Group 1, Login, Table data, Location History, New-Account, AccountRecovery, Account, Admin, and Automation.

Node-RED interface showing a flow diagram and the "Edit function node" panel.

Flow Diagram: The flow starts with a "Sign-In Section" node, which triggers a "Dashboard Sign-In" node. This node is connected to a "msg" node, which then triggers a "Log out" node. The "Log out" node is connected to a "Redirect" node.

Edit function node panel:

- Name:** = 2 : Wrong Password
- Setup:** On Start, On Message, On Stop
- Code:**

```
1 msg.payload = "Invalid Password";
2 return msg;
```

Dashboard: The dashboard is titled "dashboard" and contains a list of nodes: Admin panel, ADMINISTRATION, Group 1, Admin panel, Group 1, Login, Table data, Location History, Table data, Location History, New-Account, AccountRecovery, Account, Admin, and Automation.

Node-RED interface showing a flow diagram and the "Edit function node" panel.

Flow Diagram: The flow starts with a "Sign-In Section" node, which triggers a "Dashboard Sign-In" node. This node is connected to a "msg" node, which then triggers a "Log out" node. The "Log out" node is connected to a "Redirect" node.

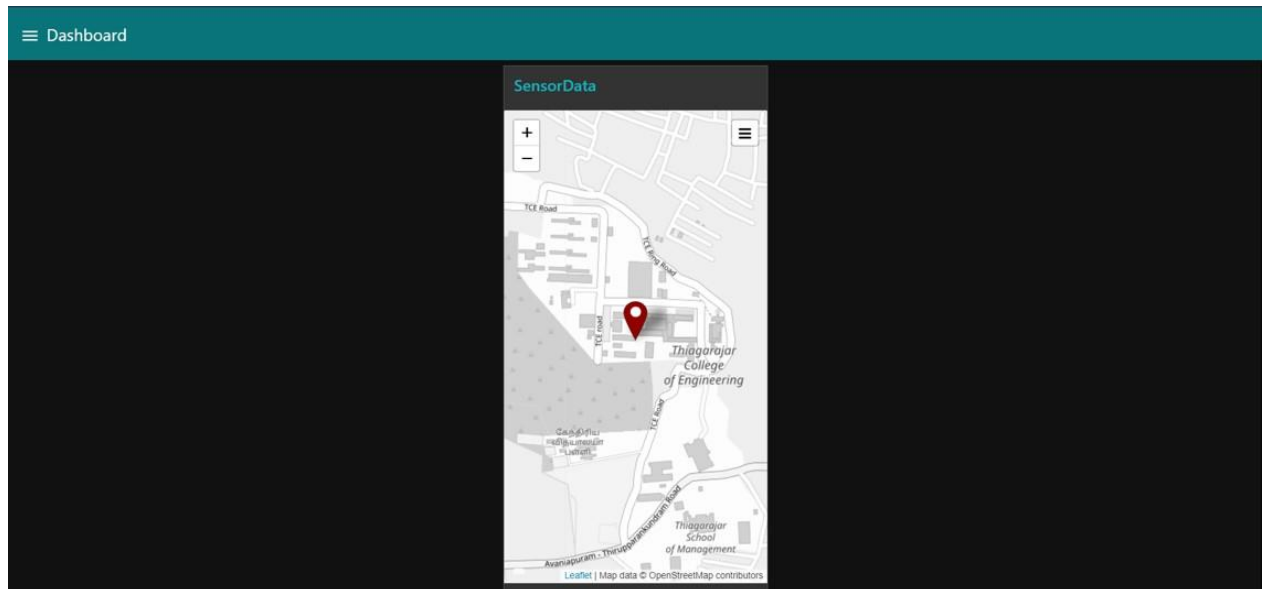
Edit function node panel:

- Name:** = 4 : System In Use
- Setup:** On Start, On Message, On Stop
- Code:**

```
1 msg.payload = "System is used by other user.";
2 return msg;
```

Dashboard: The dashboard is titled "dashboard" and contains a list of nodes: Admin panel, ADMINISTRATION, Group 1, Admin panel, Group 1, Login, Table data, Location History, Table data, Location History, New-Account, AccountRecovery, Account, Admin, and Automation.

7.3 Dashboard



IBM Watson IoT Platform

days@student.tce.edu
ID: h2zghq

Browse Action Device Types Interfaces

Search by Device ID

Device Simulator

Add Device

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
12345	Connected	NodeMCU	Device	Oct 10, 2022 6:35 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
status	{"name":"Child","lat":9.882190226007319,"lon"...	json	a few seconds ago
status	{"name":"Child","lat":9.882190226007319,"lon"...	json	a few seconds ago
status	{"name":"Child","lat":9.882190226007319,"lon"...	json	a few seconds ago
status	{"name":"Child","lat":9.882190226007319,"lon"...	json	a few seconds ago

IBM Watson IoT Platform

daya@student.tce.edu
ID: h2xjhq

Browse Action Device Types Interfaces

Search by Device ID

Device ID Status

12345 Connected

Identity Device Information

The recent events listed show the live

Event Value

status {"name":"Child",

status {"name":"Child",

status {"name":"Child",

status {"name":"Child",

status {"name":"Child",

Event Payload

Event Name status

Time Received Nov 19, 2022 1:40 PM

```
1 {
2   "name": "Child",
3   "lat": 9.882190226007319,
4   "lon": 78.08165482089441
5 }
```

IBM Watson IoT Platform

daya@student.tce.edu
ID: h2xjhq

Browse Action Device Types Interfaces

Add Device

Device ID Status Device Type Class ID Date Added Descriptive Location

12345 Connected NodeMCU Device Oct 10, 2022 6:35 PM

Identity Device Information Recent Events State Logs

Showing Raw Data | No Interfaces Available

Property	Value	Type	Event	Last Received
name	Child	String	status	a few seconds ago
lat	9.882190226007319	Number	status	a few seconds ago
lon	78.08165482089441	Number	status	a few seconds ago

Items per page 50 | 1-1 of 1 item

1 of 1 page

IBM Watson IoT Platform

daya@student.tce.edu
ID: h2xjhq

Browse Action Device Types Interfaces

Add Device

Device ID Status Device Type Class ID Date Added Descriptive Location

12345 Connected NodeMCU Device Oct 10, 2022 6:35 PM

Identity Device Information Recent Events State Logs

Diagnostic Logs

A list of device errors and timestamps detailing when the error occurred.

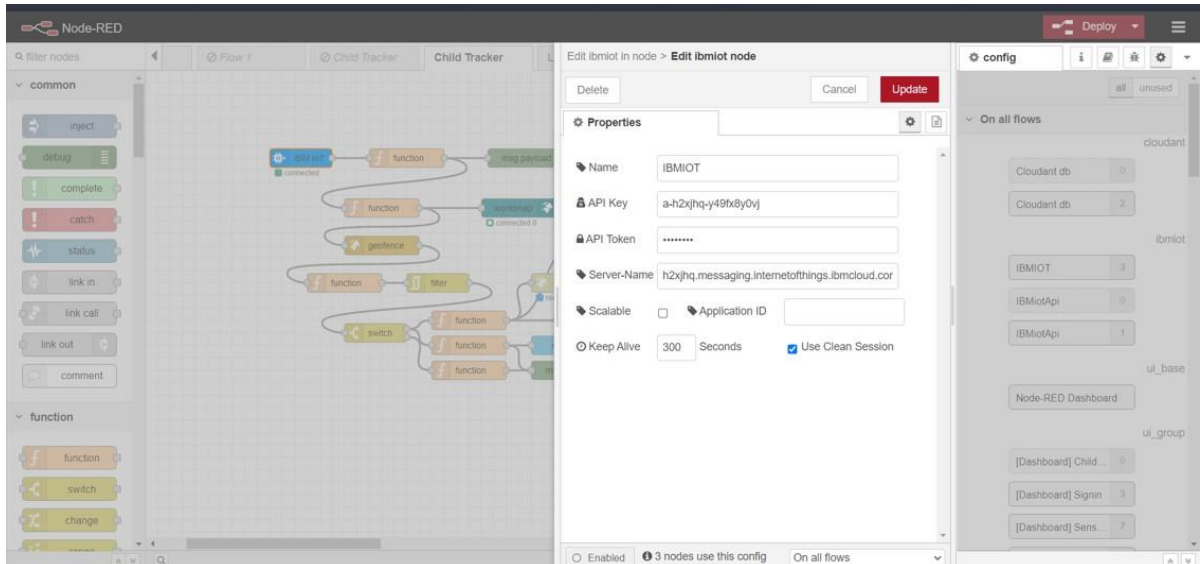
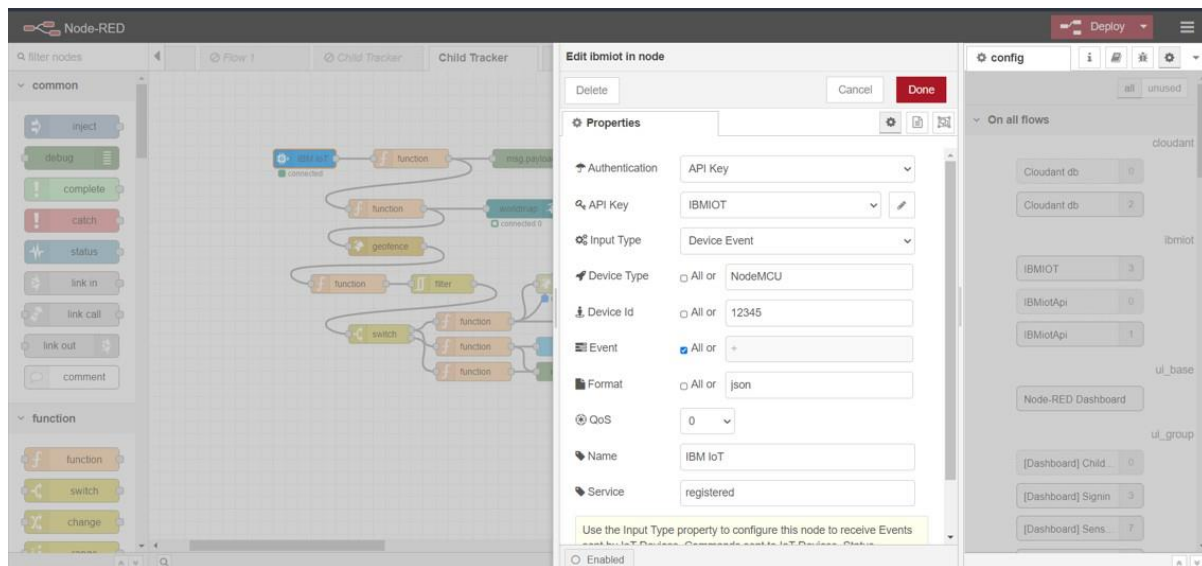
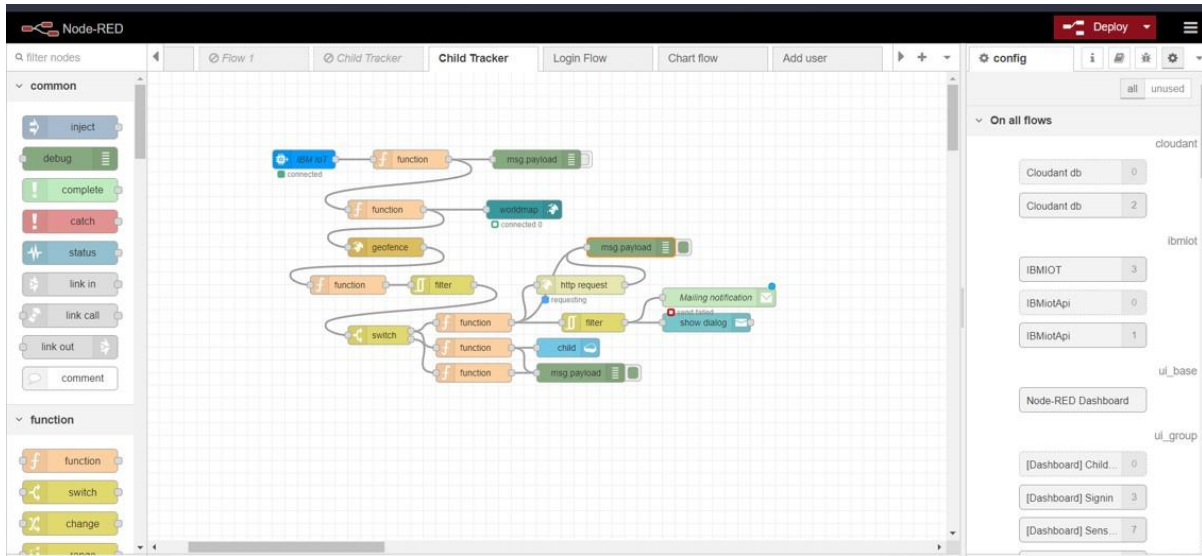
Severity	Message	Timestamp
----------	---------	-----------

No logs are available.

Connection Logs

A list of the connection events reported for this device.

Message	Timestamp
Token auth succeeded: ClientID=d:h2xjhq:Nod...	Nov 19, 2022 1:32 PM
Closed connection. The connection has complet...	Nov 19, 2022 1:31 PM
Token auth succeeded: ClientID=d:h2xjhq:Nod...	Nov 19, 2022 12:51 PM
Closed connection. The connection was closed ...	Nov 19, 2022 12:44 PM
Token auth succeeded: ClientID=d:h2xjhq:Nod...	Nov 19, 2022 11:31 AM
Closed connection. The connection was closed ...	Nov 19, 2022 1:09 AM
Closed connection. The client ID was reused.	Nov 18, 2022 11:42 PM



Node-RED interface showing a flow with an inject node, a function node, and a switch node. The function node is selected, and the "Edit function node" dialog is open, displaying the following JavaScript code:

```
1 var name = msg.payload.name
2 var lat = msg.payload.lat
3 var lon = msg.payload.lon
4 global.set('latitude',lat)
5 global.set('longitude',lon)
6 global.set('name',name)
7 return msg;
```

The "config" panel on the right shows the "On all flows" section with the following settings:

- cloudant: Cloudant db 0, Cloudant db 7
- ibmiot: IBMIOT 3, IBMIOTApi 0, IBMIOTApi 1
- ui_base: Node-RED Dashboard
- ui_group: [Dashboard] Child 0, [Dashboard] Signin 3, [Dashboard] Sens 7

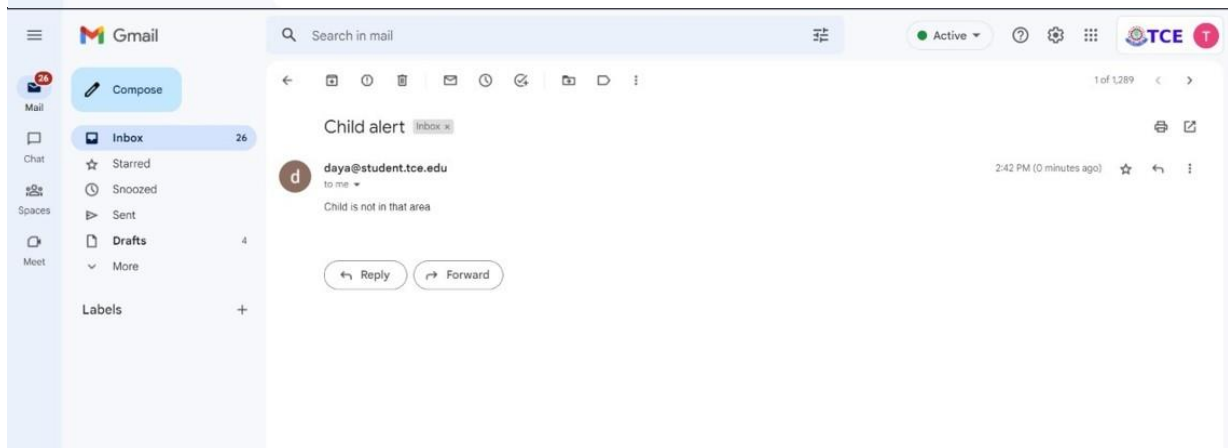
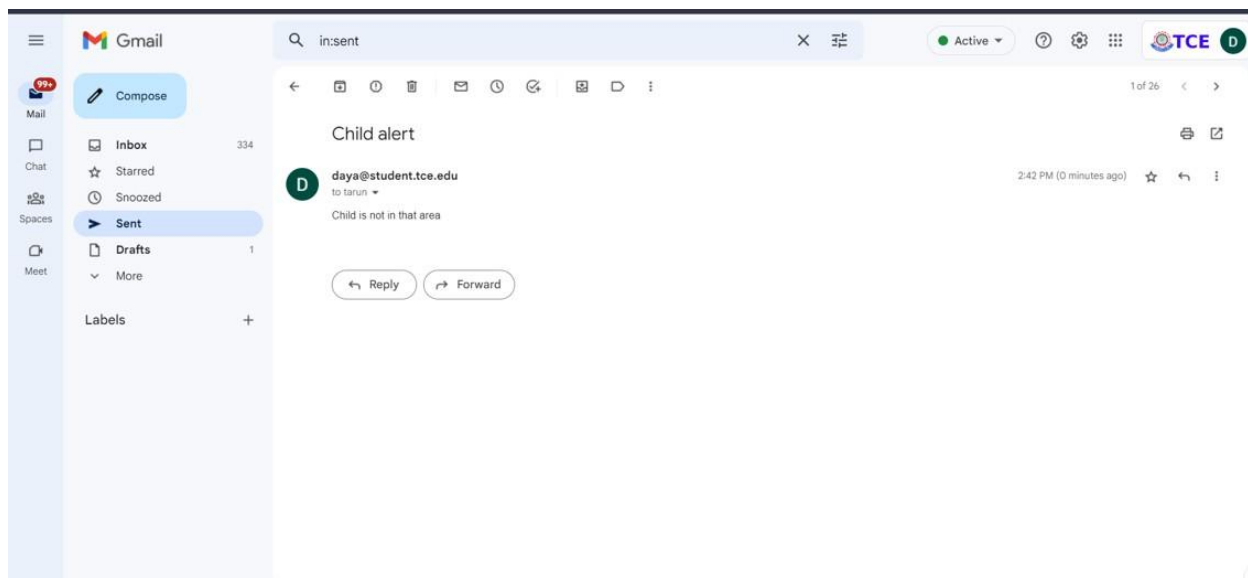
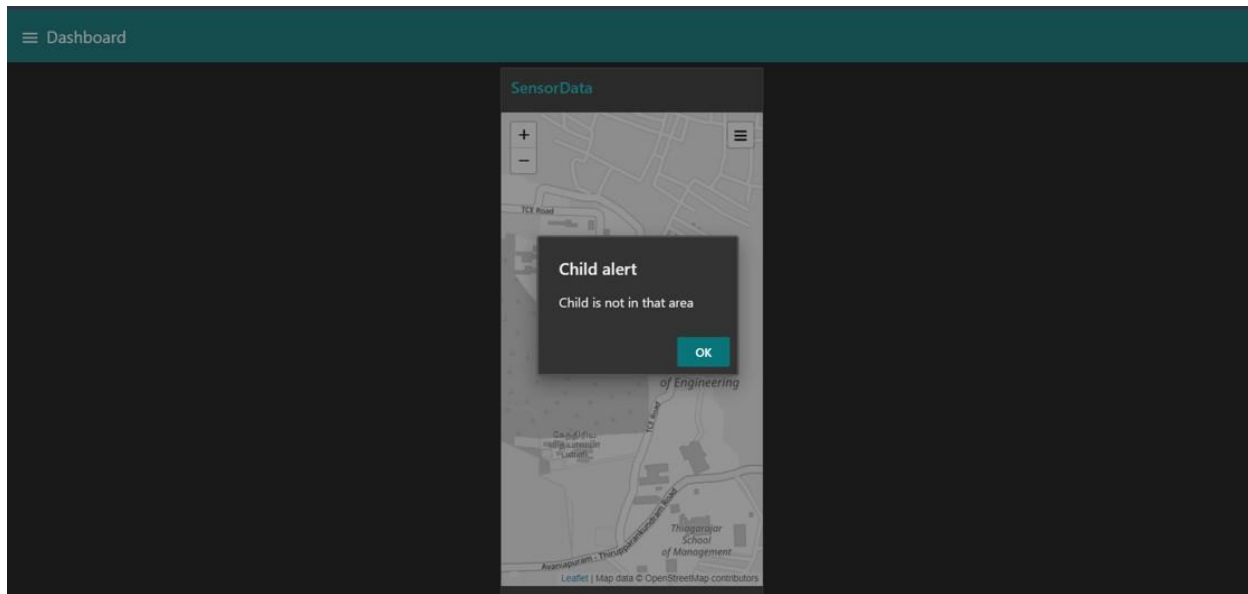
Node-RED interface showing the same flow as the first image. The function node is selected, and the "Edit function node" dialog is open, displaying the following JavaScript code:

```
1 msg.payload.class global
2   'name':global.get('name'),
3   'lat':global.get('latitude'),
4   'lon':global.get('longitude')
5 }
6 return msg;
```

The "config" panel on the right shows the "On all flows" section with the following settings:

- cloudant: Cloudant db 3, Cloudant db 2
- ibmiot: IBMIOT 3, IBMIOTApi 0, IBMIOTApi 1
- ui_base: Node-RED Dashboard
- ui_group: [Dashboard] Child 0, [Dashboard] Signin 3, [Dashboard] Sens 7

7.4 Notification



Node-RED interface showing a flow titled "Child Tracker". The flow includes nodes for inject, function, msg payload, geofence, filter, http request, child, and msg payload. The right sidebar shows the debug console with logs for the "msg payload" node.

```
11/19/2022, 2:21:13 PM node debug 2
ist-2?type=NodeMCULink12345/ev/status/rtm/json :
msg payload : array(39)

11/19/2022, 2:21:18 PM node debug 2
ist-2?type=NodeMCULink12345/ev/status/rtm/json :
msg payload : array(40)

11/19/2022, 2:21:23 PM node debug 2
ist-2?type=NodeMCULink12345/ev/status/rtm/json :
msg payload : array(41)

11/19/2022, 2:21:28 PM node debug 2
ist-2?type=NodeMCULink12345/ev/status/rtm/json :
msg payload : array(42)
```

Node-RED interface showing the "Edit function node" dialog. The function code is:

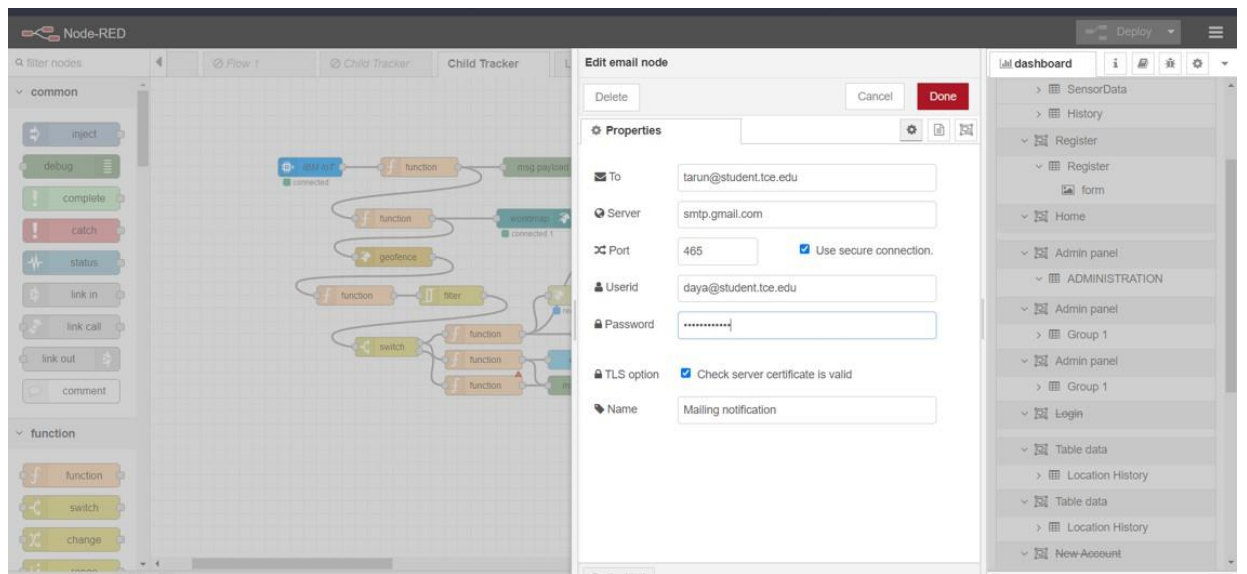
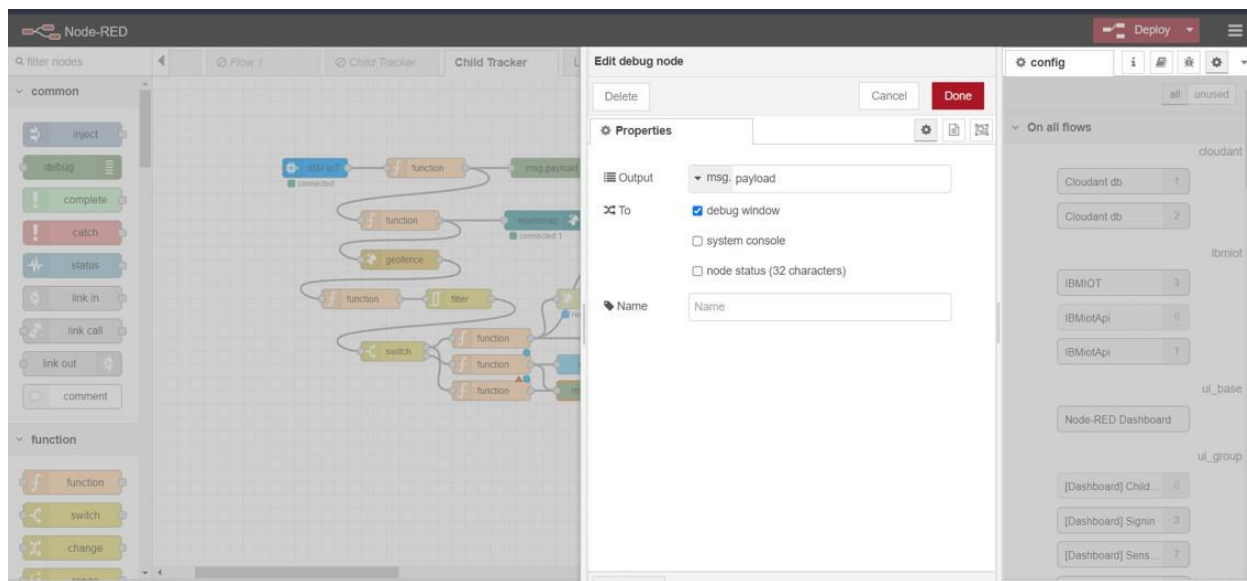
```
1 msg.topic = "Child alert"
2 msg.payload="Child is not in that area"
3 return msg;
```

The right sidebar shows the configuration panel with various settings for the flow.

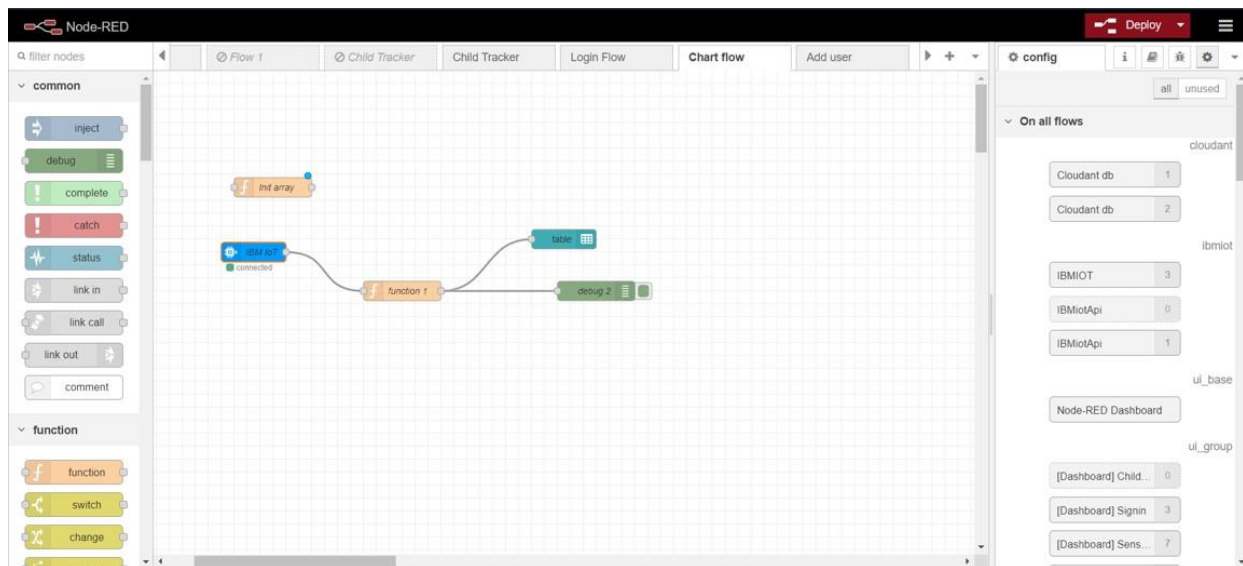
Node-RED interface showing the "Edit function node" dialog. The function code is:

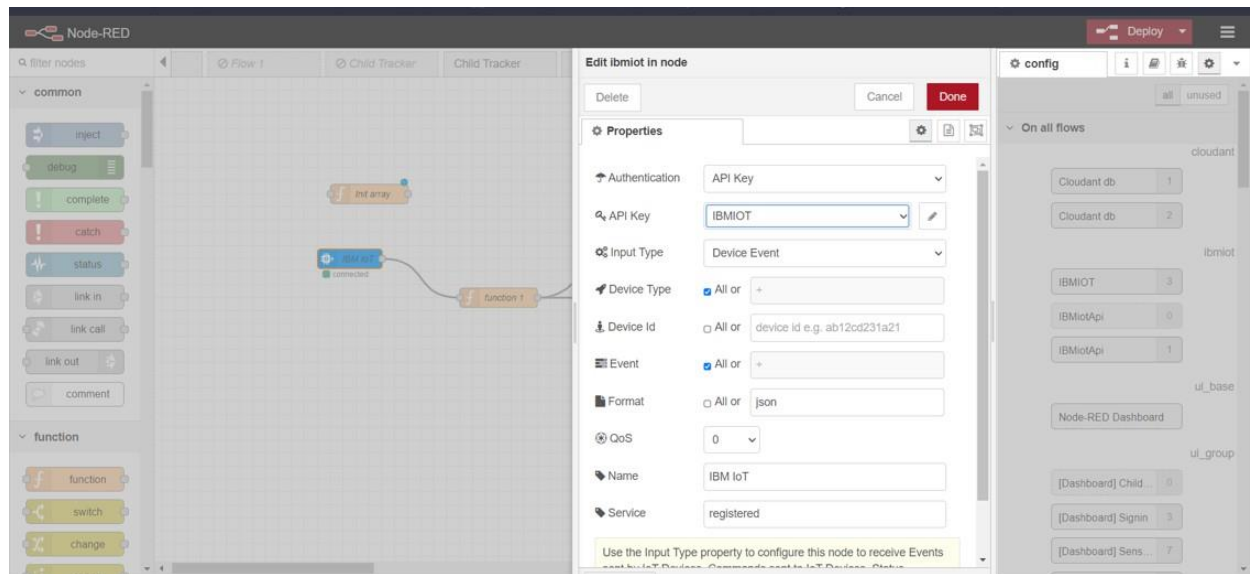
```
1 var d = new Date();
2
3 var utc = d.getTime() + (d.getTimezoneOffset() * 60000);
4
5 var offset = 5.5; // This is the offset for UTC+3, in your case
6
7 var newDate = new Date(utc + (3600000*offset));
8
9 msg.payload = {
10   "message": "Exit",
11   "time": newDate.toLocaleString(),
12   "name": global.get('name'),
13   "lat": global.get('latitude'),
14   "lon": global.get('longitude')
15 };
16
17 return msg;
```

The right sidebar shows the configuration panel with various settings for the flow.

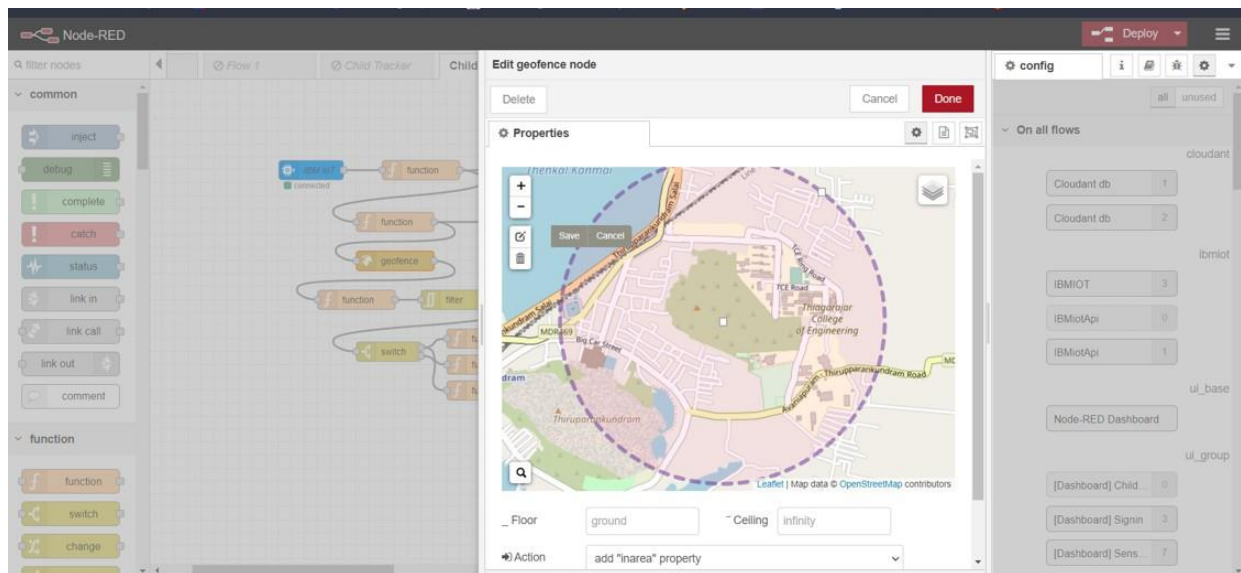


7.5 Admin panel

[illegible]



7.6 Setting Geo-fence



8. TESTING

Scenarios:

1. Verify python code is run without error.
2. Verify the login the cloud services.
3. Verify, create a device in the IBM Watson IoT platform and get the device credentials.
4. Verify the events are shown in the card.
5. Verify the events is stored in the database,
6. Verify to create a node-red service.
7. To create a web UI to interact with users.
8. To send SMS to the particular child's guardian.
9. Verified users are able to log into the app with valid credentials.
10. Verify it show the location in app

8.1 User Acceptance Testing

Purpose of Document:

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

Detect 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	0	10
Duplicate	0	0	0	1	1
External	2	0	0	1	3
Fixed	6	2	0	0	8
Not Reproduced	0	1	1	0	2
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	13	6	3	2	24

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	1	0	0	1
Client Application	2	0	0	2
Security	1	0	0	1
Outsource Shipping	1	0	0	1
Exception Reporting	1	0	0	1
Final Report Output	2	0	0	2
Version Control	2	0	0	2

9. RESULTS

As per the tabulations given below, the stress testing of the project has been done and all the related attributes convey the results of this project. The load test has been done for about thirty minutes and the end goals are met. As stated in the project planning phase, Python has been used as a principle programming language, along with the cloud services provided by IBM. With the Python base code, IBM watson has been integrated using necessary python libraries and the same has been configured on the Watson dashboard page.

Also, SMS service has been available to intimate the parents through traditional messaging services as a custom, in case they forget to see the updates on their customized dashboard. For that particular messaging functionality, similar GSM modules and libraries have been used for seamless execution of the application logic. In conclusion, the testing results prove to be satisfactory and the results are given.

9.1 Performance Metrics

NFT Test approach	
Load Test	
Scenario Name	Load Test - Location Tracker SAMPLE PROJECT
Scenario Type	Load Test - Duration 30 minutes
Scenario Objectives	To Stimulate Python Code(Location Details) and to monitor the performance of Location Tracker SAMPLE PROJECT
Steps	1. We have integrate IBM Watson IoT Platform in order to get this Location details from python program. 2. We also integrate fast SMS service in order to send an alert to guardian or parent
Entry Criteria	Test data is set-up. All the Components(software & hardware) is set-up. It is completed successfully.
Exit Criteria	Response time meets the actual Result. Test completion report is agreed upon by mentors.

NFT - Risk Assessment						
S.No	Project Name	Scope/feature	Functional Changes	Hardware Changes	Software Changes	Risk Score
1	IoT Based Safety Gadget for Child Safety Monitoring & Notification	Existing	No Changes	No Changes	No Changes	GREEN
Justification						
As we have completed the project successfully						

NFT - Detailed Test Plan		
S.No	Project Overview	NFT Test approach
1	Track the location & send an alert to the particular's person	Load Test

End Of Test Report				
S.No	Project Overview	NFT Test approach	Test Outcome	Approvals/SignOff
1.	We need to Track the location of particular child suppose, If the child crosses the geofence. It is send SMS to that parents/guardian then we need to track the location.	Load Test	Response time meets the actual Result.	Project's Mentors

10. ADVANTAGES & DISADVANTAGES

Every project carries its own share of advantages and disadvantages that may affect the performance and efficiency of the project to a scale of the concerned attribute. So, the pros and cons of this project have been listed below.

10.1 Advantages:

- Monitoring your child's location as they travel to and from school
- Tracking children with special needs
- Knowing where your child is while they play outside
- Keeping track of them on vacations or trips
- Peace of mind when they are in someone else's care
- Reducing the risk of abductions
- Contingency in case of emergency

10.2 Disadvantages:

- Young people may respond to being tracked by becoming **increasingly** secretive and flouting the surveillance by, for example, leaving their phone at a friend's house so their parents think they're there.
- Young people run the risk of **not** learning to be independent and safe on their own.

- Children need a smartphone for their parents to install a tracking app, but this can **expose** them to the potential dangers associated with social media and the internet such as cyberbullying, inappropriate contact with strangers and unsupervised access to inappropriate information.
- If they're being tracked, young people may feel their parents think they **can't** be trusted. By contrast, if they feel they are trusted, such responsibility can help them behave in a trustworthy manner. Teenagers might feel they're mistrusted and **controlled** by 'helicopter' parents. Make sure the discussions you have with them are transparent and always listen to their feedback.

11. CONCLUSION

“IoT Based Safety Gadget for Child Safety Monitoring and Notification”, project tends to cater the need of busy parents to keep track of their children's location all the time at their own comfort location. It is not a necessity that a parent needs to know their children's location all the time, as it is a clear issue of trust and privacy invasion. This whole project is in the gray area regarding the privacy invasion by the parents on their own children. But, this project only comes to fruit to provide a solution to ensure the safety of children, rather than as a tool to spy on them, all the time. Hence, it should come as no surprise that not everybody would be complicit in this project's real world implementation, either parents or children. Be that as it may, the goals we took upon when starting this project have been achieved, rigorous testing has been done to ensure the successful implementation of the project and the stats have been given to corroborate the same.

Parents, especially those who live in urban areas, need to work day and night to sustain the family which causes them to not know where their child is going during the working hour. However, with the child tracking app, parents can track and monitor their child with just a simple app. It is not possible for the parent to always stay beside the children as most of the parents need to go for work. By having this child tracking system, parents can track the location of their children. In order to avoid kidnapping cases, the child tracking system is needed.

12. FUTURE SCOPE

Like any other project that utilizes the bleeding edge technologies, these projects will tend to have improvements along the course of time. A child safety gadget is a device that is designed to help keep children safe. There are many different types of child safety gadgets available, including devices that help to prevent accidents, those that help to keep children from getting lost, and those that help to keep them from being harmed by strangers.

The Proposed system can be used for child security. The product can be sold directly to the parents and childcare centers. Worry of the parents' increased crime rates in the country can be brought down a notch with this gadget.

With the advancement of technology, there are many new and innovative products being developed that can help keep children safe. Some of the newer products include GPS tracking devices, wireless camera systems, and even biometric devices that can identify a child by their unique physical characteristics. With the continued development of these and other child safety products, the future may always be benefitted by the child safety gadgets.

13. APPENDIX

GitHub Link:

<https://github.com/IBM-EPBL/IBM-Project-22460-1659852356>