NALAIYA THIRAN PROJECT BASED LEARNING

KONGU ENGINEERING COLLEGE

Perundurai, Erode-638060.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

IoT Based Safety Gadget for Child Safety Monitoring & Notification

TEAM ID:
PT2022TMID27875

FACULTY MENTOR:
Mr.Vibin Mammen Vinod

INDUSTRY MENTOR:
Baradwaj.I.L

Project submitted by,

TEAM	NAME	REGISTER NUMBER
Team Leader	Govarthanan S	19ECR041
TeamMate 2	Aravind R	19ECR011
TeamMate 3	Hareesh kumar K.S	19ECR047
TeamMate 4	Bharath viyas N	19ECL223

ABSTRACT

As we know in present era everything is based on digital technology. Human being is going to connect each other by using mobile network. This project proposes an SMS based solution to reduced parents insecurity and to track children's in real time. Different devices are connected with a single device. The concerned device is connected to mobile via SMS. Child tracker helps the parents in continuously monitoring the child's location. They can simply leave their children in school or parks and create a geo-fence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geo-fence. Notifications will be sent according to the child's location to their parents or caretakers. The entire location data will be stored in the database. An Android app was designed and developed to collect the location data from cloud databaseto computethe relative distance location of a child when he or she leaves the maximum set distance, using node-red devices. Finally, a user study was conducted to analyze the user experience of the system developed.

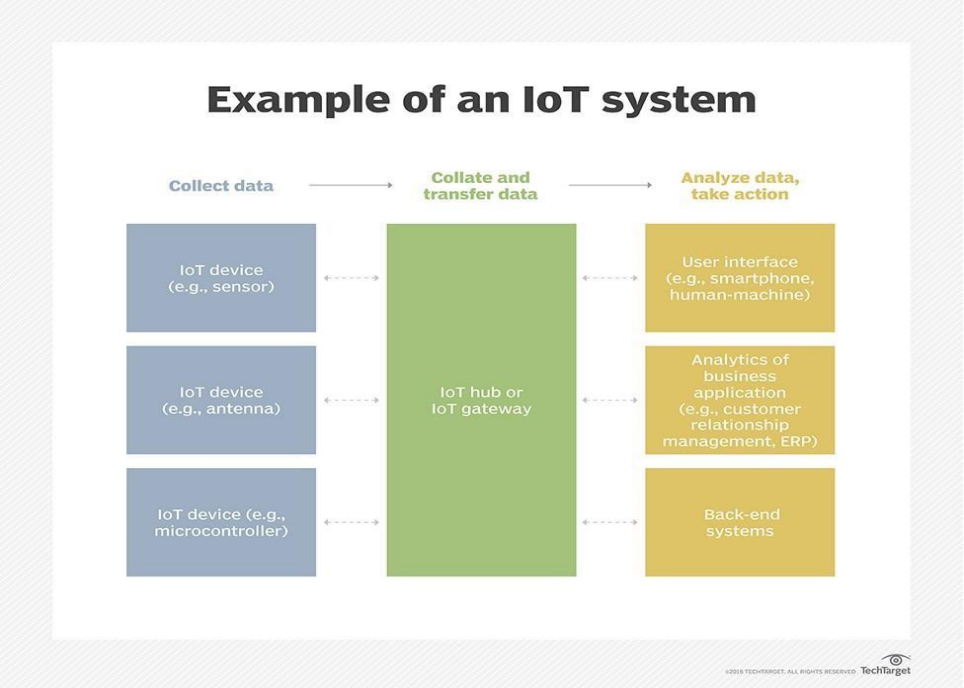
CONTENTS

1. **INTRODUCTION**
   - 1.1 Project Overview
   - 1.2 Purpose
2. **LITERATURE SURVEY**
   - 2.1 Existing problem
   - 2.2 References
   - 2.3 Problem Statement Definition
3. **IDEATION & PROPOSED SOLUTION**
   - 3.1 Empathy Map Canvas
   - 3.2 Ideation & Brainstorming
   - 3.3 Proposed Solution
   - 3.4 Problem Solution fit
4. **REQUIREMENT ANALYSIS**
   - 4.1 Functional requirement
   - 4.2 Non-Functional requirements
5. **PROJECT DESIGN**
   - 5.1 Data Flow Diagrams
   - 5.2 Solution & Technical Architecture
   - 5.3 User Stories
6. **PROJECT PLANNING & SCHEDULING**
   - 6.1 Sprint Planning & Estimation
   - 6.2 Sprint Delivery Schedule
   - 6.3 Reports from JIRA
7. **CODING & SOLUTION (Explain the features added in the project along with code)**
   - 7.1 Feature 1
   - 7.2 Feature 2
   - 7.3 Database Schema (if Applicable)
8. **TESTING**
   - 8.1 Test Cases
   - 8.2 User Acceptance Testing
9. **RESULTS**
   - 9.1 Performance Metrics
10. **ADVANTAGES & DISADVANTAGES**
11. **CONCLUSION**
12. **FUTURE SCOPE**
13. **APPENDIX**
    - Source Code
    - GitHub & Project Demo Link

INTRODUCTION

Internet of Things (IOT) is a network of physical objects or people called “things” that are embedded with software, electronics, network, and sensors that allows these objects to collect and exchange data. The goal of IOT is to extend to internetconnectivity from standard devices like computer, mobile, tablet to relatively dumb deviceslike a toaster. IOT makes virtually everything “smart,” by improving aspects of our life with the power of data collection, AI algorithm, and networks. The thing in IOT can also be aperson with a diabetes monitor implant, an animal with tracking devices, etc.

How IOT works?



An IOT ecosystem consists of web-enabled smart devices that use embedded systems, such as processors, sensors and communication hardware, to collect, send and act on data they acquire from their environments. IoT devices share the sensor data they collect by connecting to an IOT gateway or other edge device where data is either sent to the cloud to be analyzed or analyzed locally. Sometimes, these devices communicate with other related devices and act on the information they get from one another. The devicesdo most of the work without human intervention, although people can interact with the devices -- for instance, to set them up, give them instructions or access the data.

PROJECT OVERVIEW

Child safety is a major concern in any society due to the vulnerability of a child and consequently, higher rates of crimes against children. With this issue on our hands, a smart wearable Internet of Things sensor network for monitoring the environment of a child can be developed to help parents ensure the safety of their children. It must also necessarily include a mechanism for tracking the child. An advantage of this wearable device is that, according to its design, it can be accessed from any mobile device and does not mandate a lot of technical knowledge from the user to operate.

PROJECT FLOW

1.The GPS coordinates of the child will be sent to the IBM IOT platform.
2…Location can be viewed in the Web Application.
3.A parent can create a geo-fence in the web application.
4.The web application will check if the child is inside or outside the geo-fence.
5.Notifies the parents if the child goes out of the geo-fence.

To accomplish this, we have to complete all the activities and tasks listed below:

1.Create and configure IBM Cloud Services
2.Create IBM Watson IOT Platform
3.Create a device & configure the IBM IOT Platform
4.Create Node-RED service
5.Create a database in Cloudant DB to store location data

Develop a web application using Node-RED Service:

1.Integrate the geo-fence & google map.
2.Develop a python script to publish the location details to the IBM IOT platform.

PURPOSE

Child tracker helps the parents in continuously monitoring the child's location. They can simply leave their children in school or parks and create a geo-fence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geo-fence. Notifications will be sent according to the child's location to their parents or caretakers. The entire location data will be stored in database.

LITERATURE SURVEY

EXISTING PROBLEM AND REFERENCES

M Benisha et.al [2021] has proposed a method is to send an SMS from children's wear tool to their parent or guardian. The planned method will be highly effective when compared to the other existing techniques in helping the victims. Moreover, it doesn't need any manual operation. This paper recommends a newfangled technology for child protection by using GSM so that the children will not feel abandoned while facing such social problems. The problems overawed here using Arduino UNO, GSM, sensors, MEMS, temperature and panic button by using IOT. In such case, Heartbeat Sensor track the best rate for children and sends the emergency message by using the GSM to save contacts.

Ganesh Jambuka et.al [2022], This method proposed the idea of a safety band to help women and victims in critical situations. The Bluetooth module will help to connect hardware with software. We used a band for hardware and a mobile software application. Our technology will help women who have been sexually harassed, as well as victims of accidents or other crises, by tracking and communicating their real-time location, to the family and the police via Short Message Service (SMS) using the Global System for Mobile Communications (GSM) module and Global Positioning System (GPS) module while the victim is in the process of being tracked. Our method helps them remember the coordinates of where they pressed the push button. All data will be stored on Firebase and analyzed before reporting to law enforcement and government agencies. Based on the investigation's findings, the police may take further actions to help the victims.

Dileep Reddy Bolla et.al [2018], Now a days, we see a lot of children along with their parents standing on the roads waiting for their respective school bus, in this aspect they needs to communicate from and to home and school daily. Secondly, in recent days, safer transportation of school children has become a serious issue as it is often observed that child is forgotten to exit and enter the respective stops. So this paper proposes the solution for this issue by developing a bus safety system which controls entry and exit of the student by sending SMS to the parents via tracking exact location of school bus. The system consists of RFID (Radio Frequency Identifier) card. To identify which student has entered or exited the bus, GSM (Global system for mobile communication) to send the notification, GPS for the exact location of the bus. Fire sensor, if any fire ignition and panic switch if any emergency.

S. Rajalakshmi et.al [2020],In this paper, we discuss the concept of child safety device based on Internet of things. This device can be used to monitor the temperature and motion of the child. If any problem persists, the GSM mobile communication module automatically sends a text message to the parent as SMS. The other features of the device are emergency light and alarm buzzer which are activated when the button is pressed by the child in a distress situation to seek the attention of the bystanders. The accelerometer and vibration sensors are used to detect the motion of the child. The camera is used to capture the environment of the child. The image taken is processed using convolutional neural network (CNN) which predicts the background like play area, railway station, beach, road, or classroom. The GPS module is used to record current location of the device which is used to track the device if the child is missing.

James N Gilmore et.al [2019], This method provides a critical analysis of the child wearable Jiobit, a locational tracking device that is designed to allow parents to monitor how children move through space. Emphasizing the device's incorporation of geofencing features, which allow users to program 'fences' on a paired smartphone application and receive notifications when a Jiobit wearer enters and leaves the 'fenced' areas. This artifactual analysis is paired with a discursive analysis of the company's policy documents, which readily acknowledge Jiobit's inability to serve as a fully reliable security system, while also detailing the ways in which the extraction of data is stored indefinitely and, in some cases, disclosed to third parties. Through this case study of Jiobit, I argue for critical studies of wearable technologies to attend to the ways in which their producers promise 'security' and the ways in which 'security' acts as an alibi for continuous data collection.

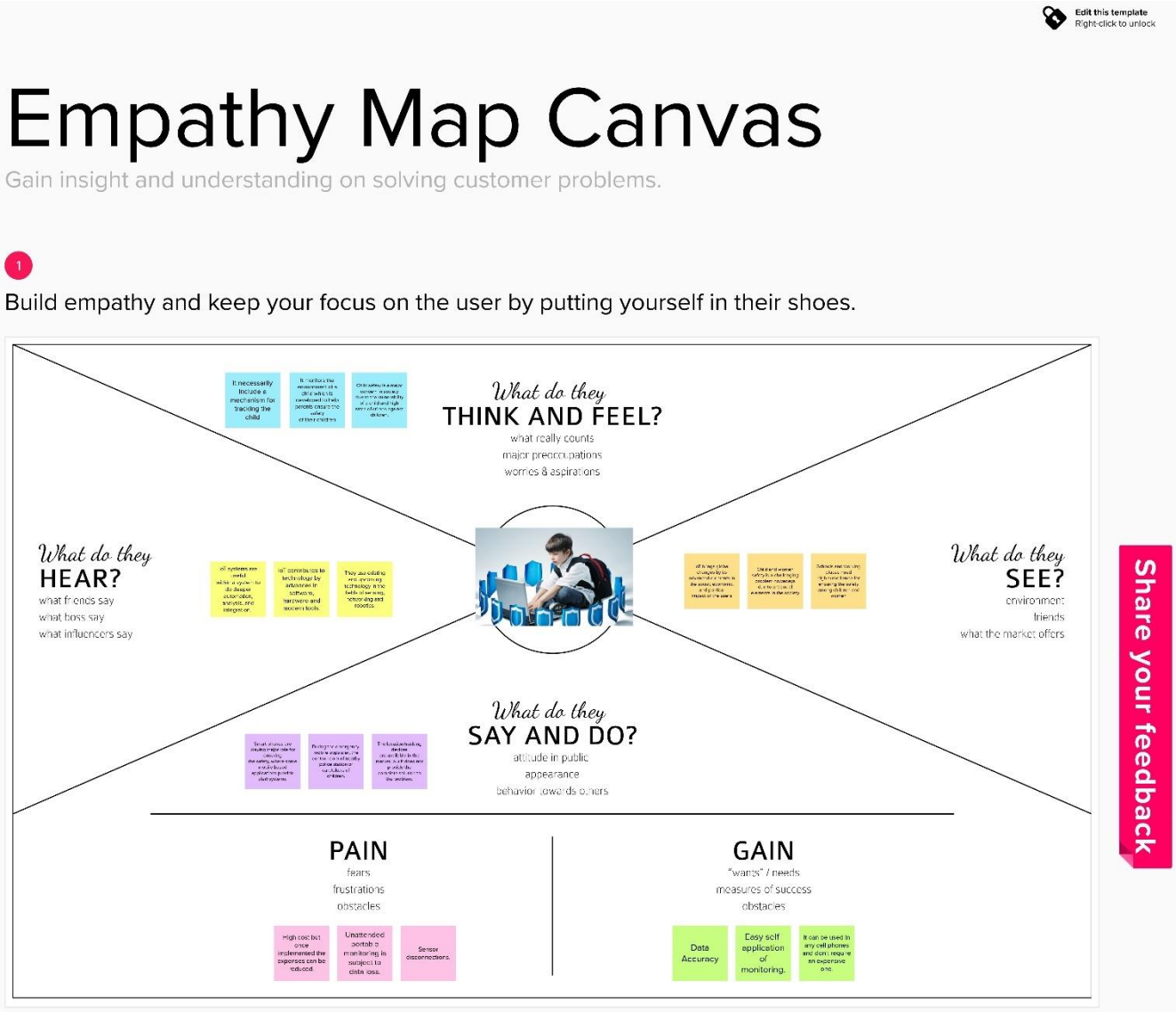
Shweta N. Shah et.al [2022], With the development of the Global Positioning System and other Navigation Satellite Systems, it is possible to locate position coordinates precisely. The growth of smart devices and high-speed data connectivity has also supported the development of applications using location information. Geofencing is a major field of location-based services that enables remote monitoring of pre-defined boundaries. This paper describes various applications of geofencing and presents a novel approach to child safety application using geofencing. A hardware setup is designed to send position coordinates of a child in real-time. A mobile application is developed for parents to monitor their children remotely. They can set up a geofence in the app and receive alerts when the child goes out of bounds. The geofencing application utilizes NavIC at its core.

M. Izham Jaya etal [2021],Geofence Alerts Application with GPS Tracking for Children Monitoring (CTS) is a mobile application that helps parents to track the location of their child. It provides the parents with the route and real-time location of the children. The first objective of this paper is to obtain a latitude, longitude, and time information of a child's location in real-time using GPS tracker. The second objective is to develop a smartphone application that capable to track the location of children in real-time. The third objective is to evaluate the functionality of the developed smartphone application in tracking children's location. Features, advantages, and disadvantages of three commercialized application are compared to collect requirements for the CTS application. The requirements are then used to design and develop the interface of CTS application using Rapid Application Design (RAD) framework. Three main modules, which are the View Current Location module, View History Route module and Setup Geofence module are proposed for the application. Additionally, a GPS tracker based on Arduino Uno board is developed to provide the longitude and latitude of children's current location. The functionality of the CTS application and the GPS tracker is then evaluated to determined bugs and its usability. It was discovered that CTS is in helping parents to track the location of their child in realtime, view the past route taken by the child, set up geofence area, and receive notification when their child enters or leave the geofence area within the scheduled time.

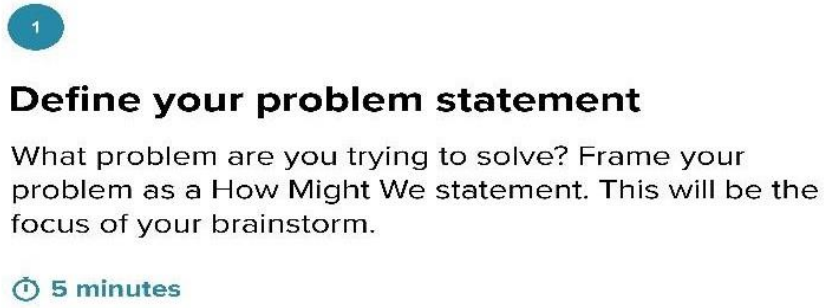
N E Indrayana et.al [2021],we implementing an application to monitor children's movements using virtual borders. This geofence is used to mark which areas can be occupied by the child. This child monitoring application with geofence facilities was built using the unified software development process (USDP) method. USDP is divided into 4 stages, namely Inception, Elaboration, Construction, and Transition. This application is designed to assist parents in monitoring children's movements in realtime. This child monitoring application with geofence facilities begins with an investigation of system requirements, followed by a system architecture design and a use case diagram design. Children use smartwatches and parents use Android smartphones. The latitude and longitude positions of the child and parent are stored in the Firebase database. Geofences are set by parents and are used to restrict children's movement in certain areas. In designing this system, the haversine formula is used to calculate the distance between the child's position and geofence to find out whether the child is still in the permitted area. When the child leaves geofencing, a response will appear to the parents.

IDEATION & PROPOSED SOLUTION

Empathy Map Canvas



Ideation & Brainstorming



PROBLEM

child's location can be monitored continuosly by their parents with the help of child tracker. Parents can avoid the fear of leaving their child alone, without their guidance. If the child crossed the geofence, the parent or caretakers will get a notification about the location. The database will store the entire location details.

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

10 minutes

TIP

You can select a sticky note and hit the pencil [switch to sketch] icon to start drawing!

Person 1

- Child tracking mechanism needs to implemented
- Create awareness to child to alert the parent
- Develop a Geofence for monitoring
- Create awareness to parents to know whether the child crossed the fence or not

Person 2

- Using the best and cost efficient hardware
- Improving the approach to be faster and performance efficient
- Allows the parents to know the current climatic condition in child location
- Using database store the childs location history and all details

Person 3

- Using Node red develop a web application
- See the area of child using camera
- Connect the data to ibm smart cloud
- Develop a product needs to be longlasting

Person 4

- Create a way for the child to communicate with their parents
- Make a beeping sound, when child crossed geofence
- Create a way for the parent to communicate with their child
- Develop a product as highly robust one

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

Based on efficiency

-> Implementing the efficient approach for child tracking.

-> Creating awareness among the working of this implementation among parents and child.

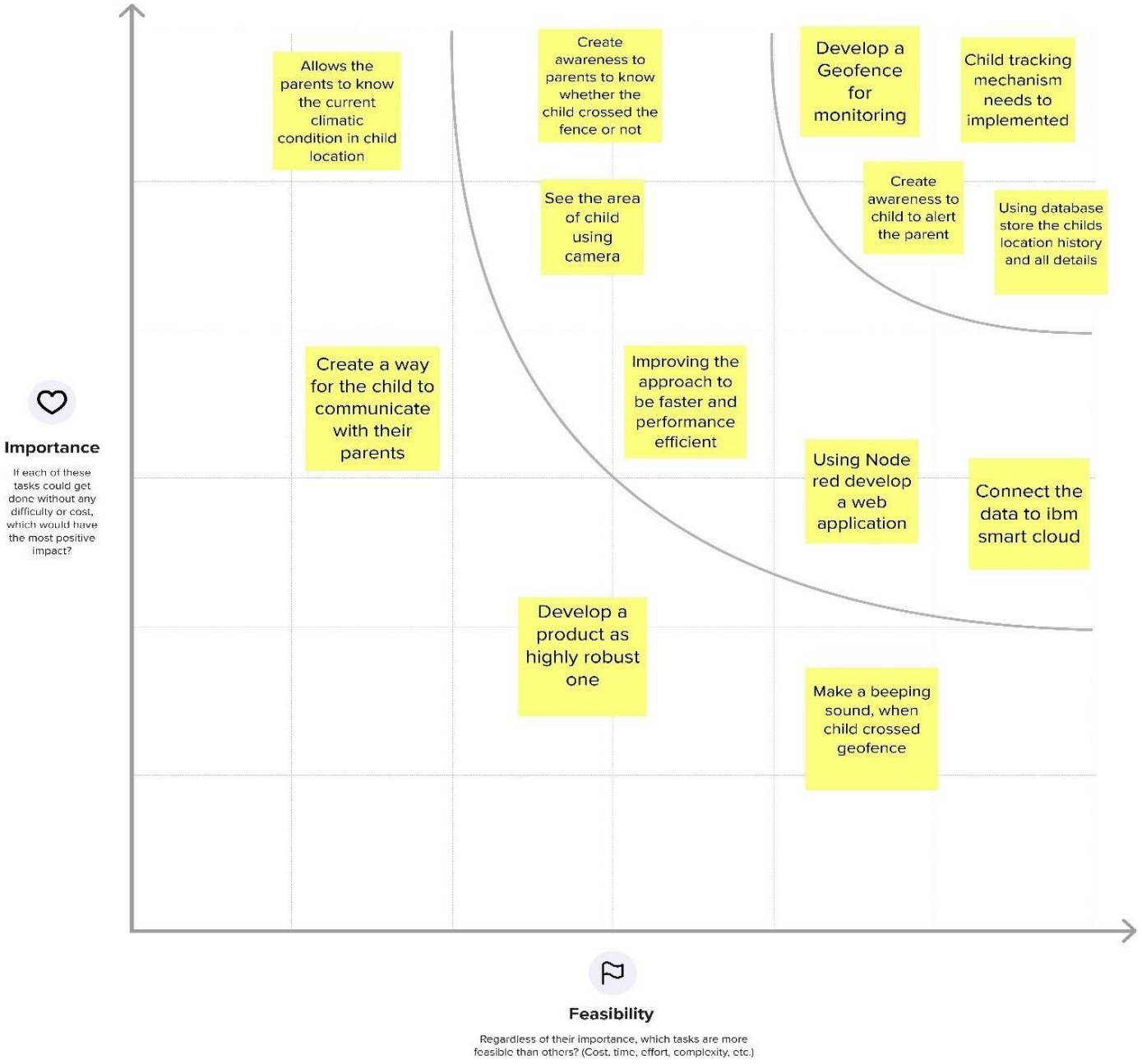
-> Implementing the cost efficient and robust methodology for detecting child location via GPS.

Based on data

-> Maintain the child location and weather condition in a database.

-> Ensure a secure database, which prevents from hacking.

-> Make sure that the child location will be accessible only by their parents or by their care taker, since the location information is sensible.


Allows the parents to know the current climatic condition in child location
Create awareness to parents to know whether the child crossed the fence or not
Develop a Geofence for monitoring
Child tracking mechanism needs to implemented
See the area of child using camera
Create awareness to child to alert the parent
Using database store the childs location history and all details
Create a way for the child to communicate with their parents
Improving the approach to be faster and performance efficient
Using Node red develop a web application
Connect the data to ibm smart cloud
Develop a product as highly robust one
Make a beeping sound, when child crossed geofence
Importance
If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?
Feasibility
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement	➢ Nowadays, Child safety is a bigger problem in the society. parents are fear about leaving or allowing their child alone. ➢ Since, many people are going for the work, they don't have much time to watch their child. Sometimes, they are thinking about their child even at the work place.
2.	Idea / Solution description	➢ With the help of IOT, we can solve this problem. The parent can make a Geofence around their required surroundings and the device will send the child's live location. ➢ If the child crossed the boundary, then the device will send notification and alert the parent. It also allows them to monitor the current weather condition in the area, where child present.
3.	Novelty / Uniqueness	➢ At the moment there are several tracking device that helps us to note ourchildren's activity with ease. But, most of them has a limited feature. With the help of our device, the parent can monitor the child live location, current weather condition, if there is any emergency the child can turn on the camera, to show the scenario to their parents and also if the child crossed our designed boundary, theparent receive a notification.
4.	Social Impact / Customer Satisfaction	➢ Even though there are many surveillance in the surrounding areas, we cannot assure that our family members are in a safe zone. ➢ But, this monitoring device will monitor every individual who are allwearing the device. It helps us to decide their members safety. ➢ As a device is small , it is comfortable to wear specific for children and it is user friendly too.

5.	Business Model (Revenue Model)	➢ Device can be obtained by paying for the IBM cloud/Watson subscription. ➢ It can be either yearly or monthly. ➢ Based on the term of subscription of 5-8% discount shall be madeavailable.
6.	Scalability of the Solution	➢ The future scope of the work is to implement the IoT device, which completely give protection to the child as much as possible and to make a fearless society.

PROBLEM SOLUTION FIT

Define CS

1. CUSTOMER SEGMENT(S)

1.Working parents or

5. AVAILABLE SOLUTIONS

1. Without, this IOT covered implementation the parents are only in a

6. CUSTOMER CONSTRAINTS

1. Mobile phone or any electronic device
2. GPS
3. GSM

Explore A

Focus on J&P, tap int

2. JOBS-TO-BE-DONE / PROBLEMS

1. Parents needs to monitor their child always, even at work.
2. 2. GPS should be on to track the location
3. 3. All data needs to be sent and store in the cloud.

9. PROBLEM ROOT CAUSE

In this generation, both father and mother in a family need to work. So, mother cannot take care the child in all the places and also they cannot leave their children freely without any fear.

7. BEHAVIOUR

Lack of internet connectivity in certain areas can cause the system to fail. Since, internet plays vital role in our implementation.

Focus on J&P, tap int

3. TRIGGERS

Nowadays, children (particularly girls) are facing many issues in this society.

So that, parents are trying to monitor them, to keep away from unwanted issues.

4. EMOTIONS: BEFORE / AFTER

Before- Parents are feeling insecurity

After- parents are feeling security

10. YOUR SOLUTION

To possess an SMS text enabled communication

between the child's wearable and also the parent

because the GSM mobile communication is

nearly present everyplace.

The tracking device can provide the

correct location of the kid and it will navigate

through google maps.

8. CHANNELS of BEHAVIOUR

- **Mobile calls during emergency situation.**
- **Notification or SMS needs to be sent to parents or care takers in emergency situation.**
- **Camera details, Weather report, Location details needs internet connectivity.**

REQUIREMENT ANALYSIS

Functional requirements

FR No.	Functional Requirement	Description
FR-1	User Registration	✓ Registration through Gmail or through phone number
FR-2	User Confirmation	✓ Confirmation via Email or OTP (one time password)
FR-3	App installation	✓ Installation through Playstore or Appstore ✓ It can be accessible through browser (website)
FR-4	Settings geofence	✓ Boundary of location to mark it as fence
FR-5	Detecting child location	✓ Detecting location via app or SMS or notification
FR-6	User Interface	✓ Separate panel for USER & ADMIN login
FR-7	Database	✓ The data gathered related to location, weather, longitude, latitude, parent details, child details, login credentials are stored in the database for future reference. ✓ The admin from the customer side, can access all this information with correct credentials

FR-8	Server	✓ The backend server has been implemented to run as a service and is deployed in an IBM cloud instance. ✓ The data collected are automatically moved to the desired database location. Parent or a customer need not to worry about that.
FR-9	GPS tracking	✓ The system has a GPS module, which gather the location, weather details of the user and stores it in database.
FR-10	API	✓ The details collected are sent to the database using an API (Application Programming Interface)
FR-11	React JS	✓ For Font End – REACT JS(Customer interface) ✓ For Back End – NODE JS(Data storage)
FR-12	GPS modules	✓ It receives data directly from satellites.
FR-13	Battery Life	✓ The device will hold the charge nearly 24 hours long. After that, they need to charge the device again for continuous usage.
FR-14	Location History	✓ The location history will help to track the child's activity. Location history will be available in server. If there is any issue, the parent can use this information for future reference.

Non-Functional requirements

FR No.	Non-functional Requirements	Description
NFR-1	Usability	✓ Device have GSM can help to inform theparents or caretaker about the current location of the child. It will be very much useful in danger situation.

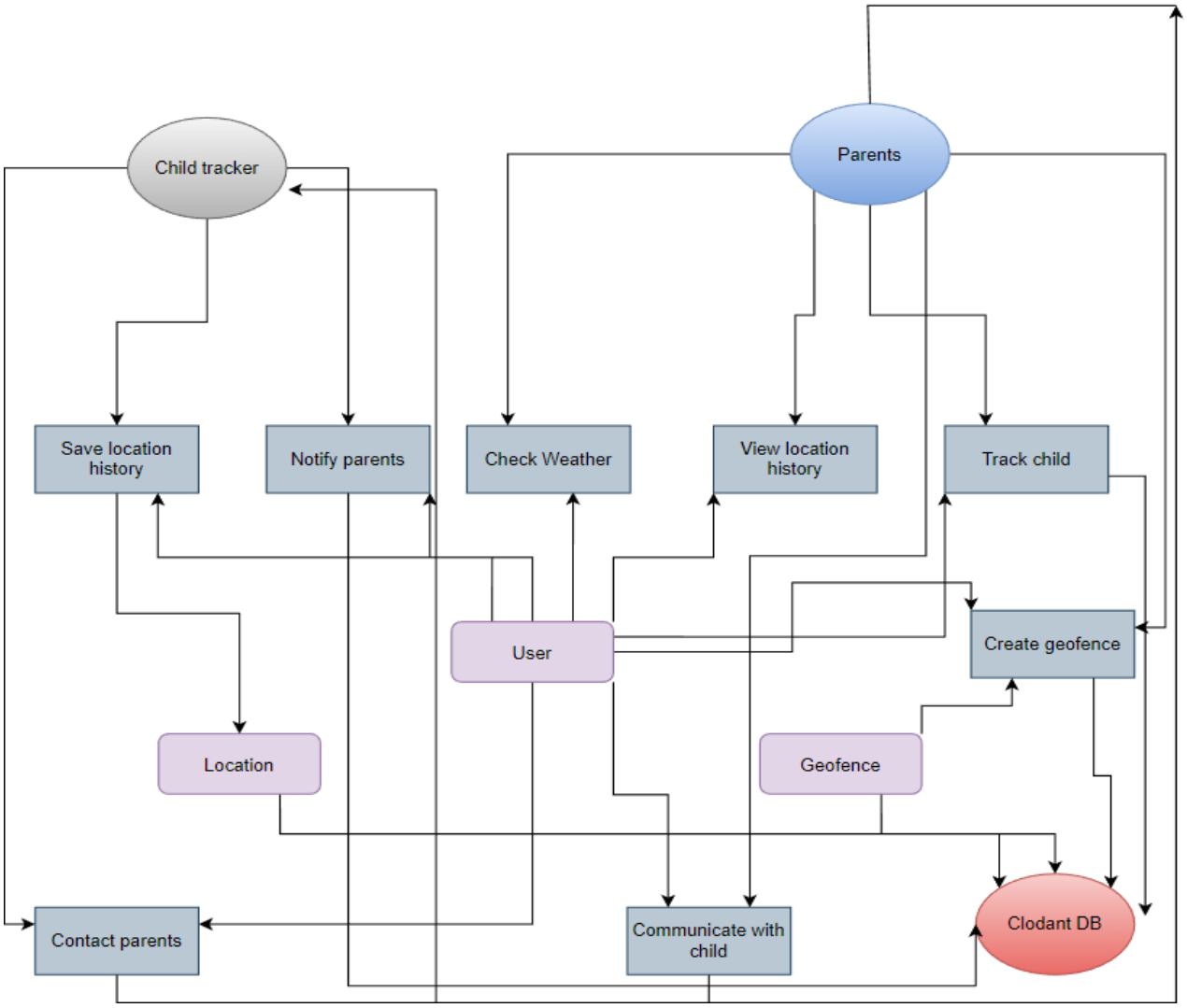
NFR-2	Security	✓ With the help of our designed geofence, Whenever the child crosses that specific area, the parents or guardian will get an instant notification about the current location to their specific device.
NFR-3	Performance	✓ Create a Child tracker which helps the parents with continuously monitoring 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-4	Availability	✓ With the help of the accurate longitude and latitude details, parents can track their child even ina crowd ✓ Get live location details of kids at anytime
NFR-5	Scalability	✓ Gadget ensures the safety and tracking of the children. ✓ Parents need not worry about their children.
NFR-6	Value	✓ Even though the parents are going for job, they need not to worry about their children. since, they can have the controllness over their child.
NFR-7	Dynamicity	✓ IoT devices may have the capability to adapt dynamically and change based on their conditions.
NFR-8	Desirability	✓ Navigation should be made easy. ✓ The user should be able to search and find the information he needs without much hassle.

PROJECT DESIGN

Data Flow Diagrams

FLOWS:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows withina system. DFD graphically representing the functions, or processes, which capture, manipulate, store, and distribute data between a system and its environment and between components of a system. The visual representation makes it a good communication tool between User and System designer. Structure of DFD allows starting from a broad overview and expand it to a hierarchy of detailed diagrams.



User Type	Functional Requirement	User Story Number	User Story / Task	Acceptanc ecriteria	Priority	Release
Parent	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 Gmail		Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-5	As a user , I need to be able toview the functions that I can perform		High	Sprint-1
Child	Notification	USN-1	As a user , I should be able to notify my parent in emergency situations		High	Sprint-2
	Store data	USN-2	As a user , I need to continuouslystore my location data into the db.		Medium	Sprint-2
	Communication	USN-3	I should be able to communicatewith my parents		Low	Sprint-3

SOLUTION AND TECHNICAL ARCHITECTURE

SOLUTION ARCHITECTURE

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

• To solve the existing business or society problem, we need to find the right technology and make use of it as much as possible.

• Describe the structural, behavioral characteristics and other aspects of the software to project stakeholders.

• Define the steps involved, features need to be focused, development phases of our target, and solution requirements needed to implement it.

• Provide specifications to resolve the problem statement according to which the solution is defined, managed, and delivered.

FEATURES:

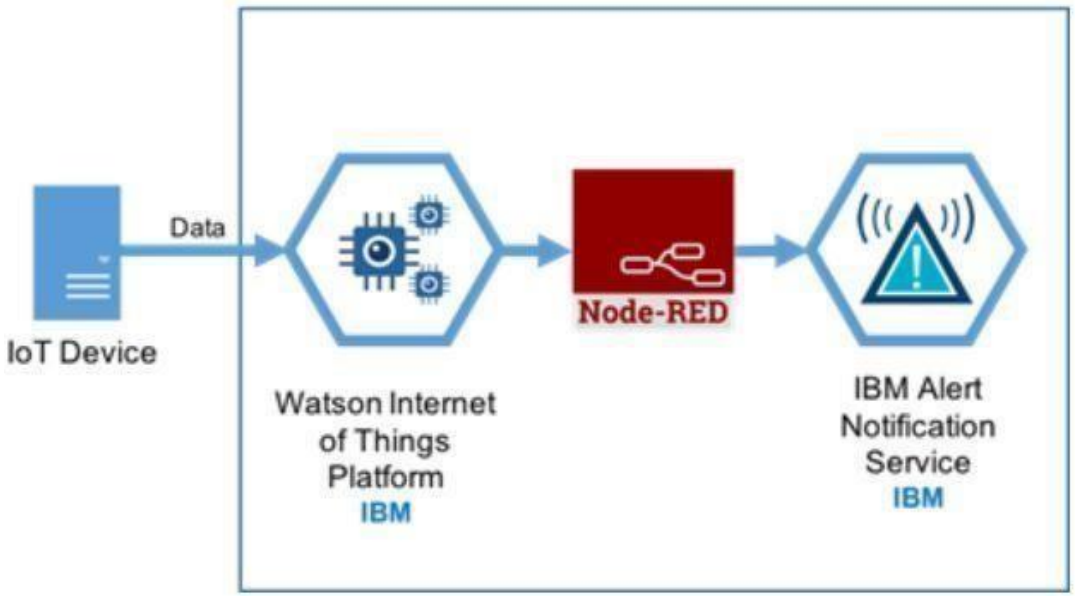
Without the direct involvement of the parents we can monitor the child with the help ofIOT based child monitoring system.

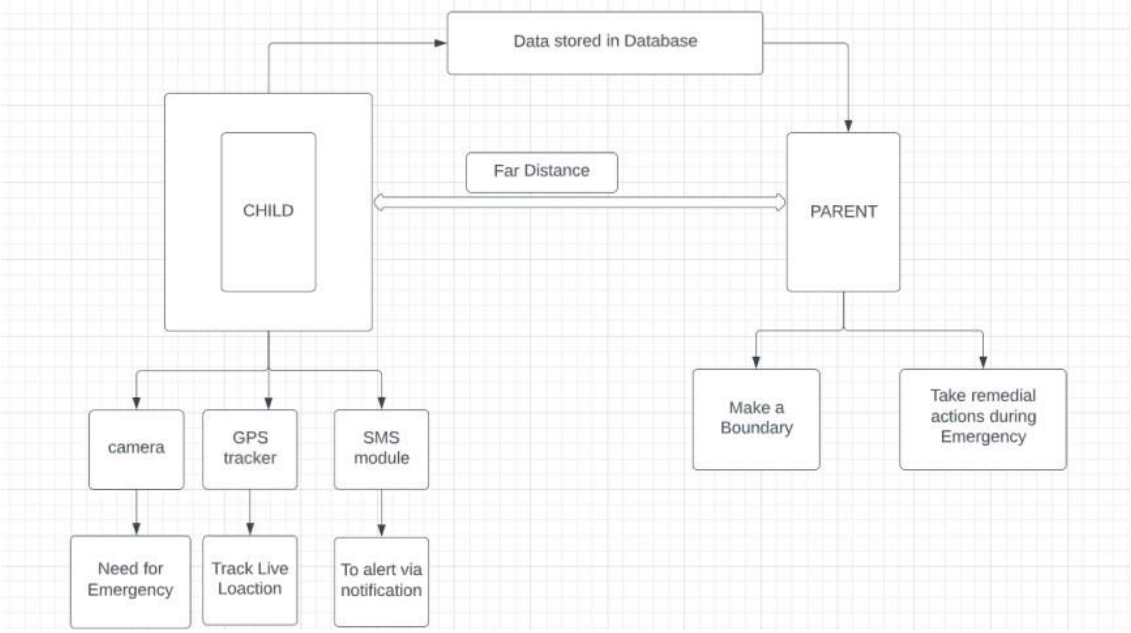
- Geo fence (specify boundary)
- GPS (to track live location)
- Notification or SMS (to alert the parents)

SOLUTION:

- The parent can make a Geofence around their required surroundings and the device will send the child's live location.
- If the child crossed the boundary, then the device will send notification and alert the parent. It also allows them to monitor the current weather condition in the area, where child present. During dangerous situation, the camera will record the surroundings and make it to know to their parents.

SOLUTION ARCHITECTURE DIAGRAM:





Architecture and data flow of the child safety gadget system

TECHNICAL ARCHITECTURE:

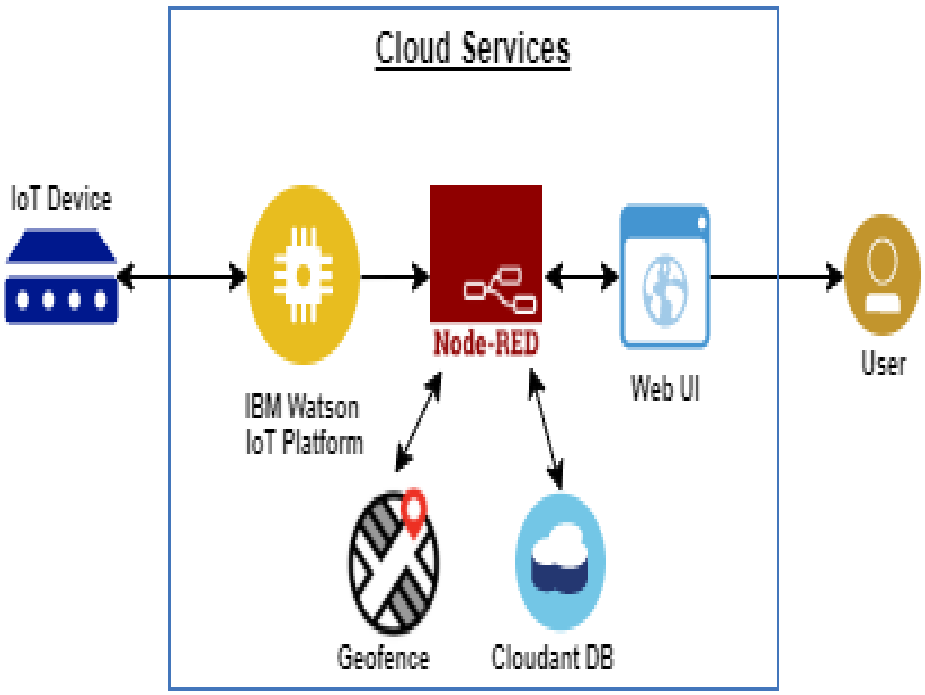


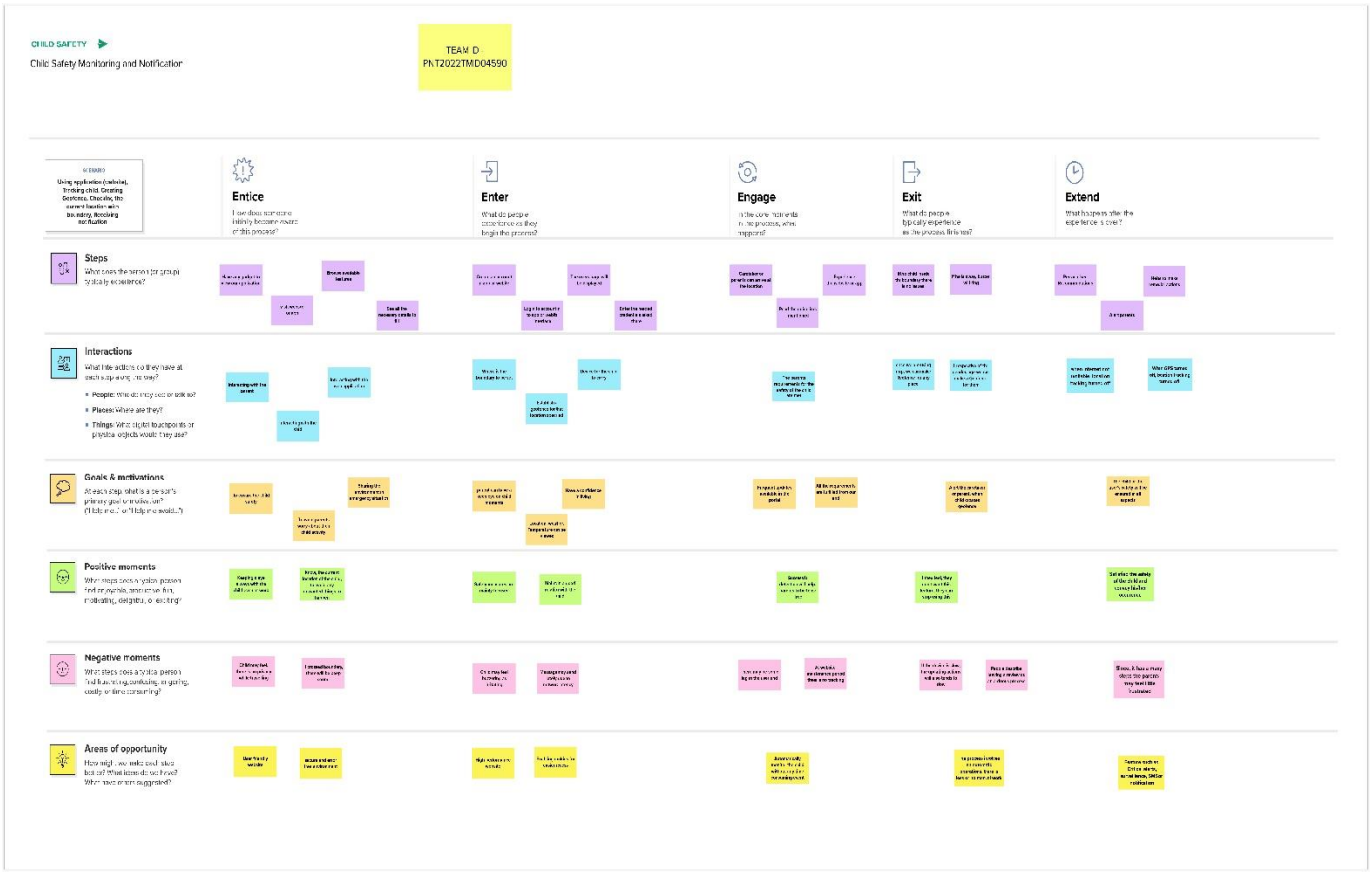
Table-1 :

S.No	Component	Description	Technology
1.	UI (user Interface)	The user interface helps user to interact withthe portal and make use of the available features.	Website (web application)
2.	Application	The collected data about the location, weather, camera footage and all other records are instantlystored in the IBM cloud database for future reference.	IBM service
3.	Database	Data to be segregated and secured in the form ofrelational DBMS	MySQL
4.	Cloud Database	IBM	IBM Cloudant
5.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service
6.	External availability	To access the children location	GPS location
7.	Infrastructure(cloud)	Application Deployment Cloud Local Server Configuration	Cloud Foundry

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Interface	The solution will be implemented for the users (parents or caretakers) in the form of website or mobile application.	Interface design
2.	Security	The details about the children are accessible only using the correct login credentials, since the data are sensitive.	IAM (identity & access management)
3.	Scalable Architecture	The app will comes the way easier to handleand operate.	Cloud
4.	Availability	The developed solution tends to be available in themarket at any time	Yet to be done
5.	Performance	Highly proper and betterment functionalities are tobe ensured in the designed solution	Yet to be done

USER STORIES



PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation

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 serviceby entering my email and password.	2	High	Govarthanan
Sprint-1		USN-2	As a user, I will receive confirmation emailonce I have registered for theapplication.	1	High	Aravind
Sprint-1		USN-4	As a user, I canregister for the application through Gmail	2	Medium	Bharath viyas
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	Hareesh kumar
Sprint-3	Dashboard	USN-6	I can access dashboard of mine.	5	Low	Govarthanan
Sprint-3		USN-7	As a user I canaccess Geofen ce feature..	3	Medium	Aravind

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3		USN-8	As a user I can access geofence, to certain distance.	3	High	Hareesh kumar
Sprint-4	Application	USN-9	To design applicati onthat satisfythe user needs and demands.	2	Medium	Govarthanan
Sprint-4		USN-10	To make this asmost efficient and effective.	5	Medium	Govarthanan
Sprint-4		USN-11	As a user I canregister and login easily.	3	High	Bharath viyas

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	5	7 Days	24 Oct 2022	31 Oct 2022	5	31 Oct 2022
Sprint-2	3	7 Days	31 Oct 2022	07 Nov 2022	3	07 Nov 2022
Sprint-3	11	7 Days	07 Nov 2022	14 Nov 2022	11	14 Nov 2022
Sprint-4	10	7 Days	12 Nov 2022	19 Nov 2022	10	19 Nov 2022

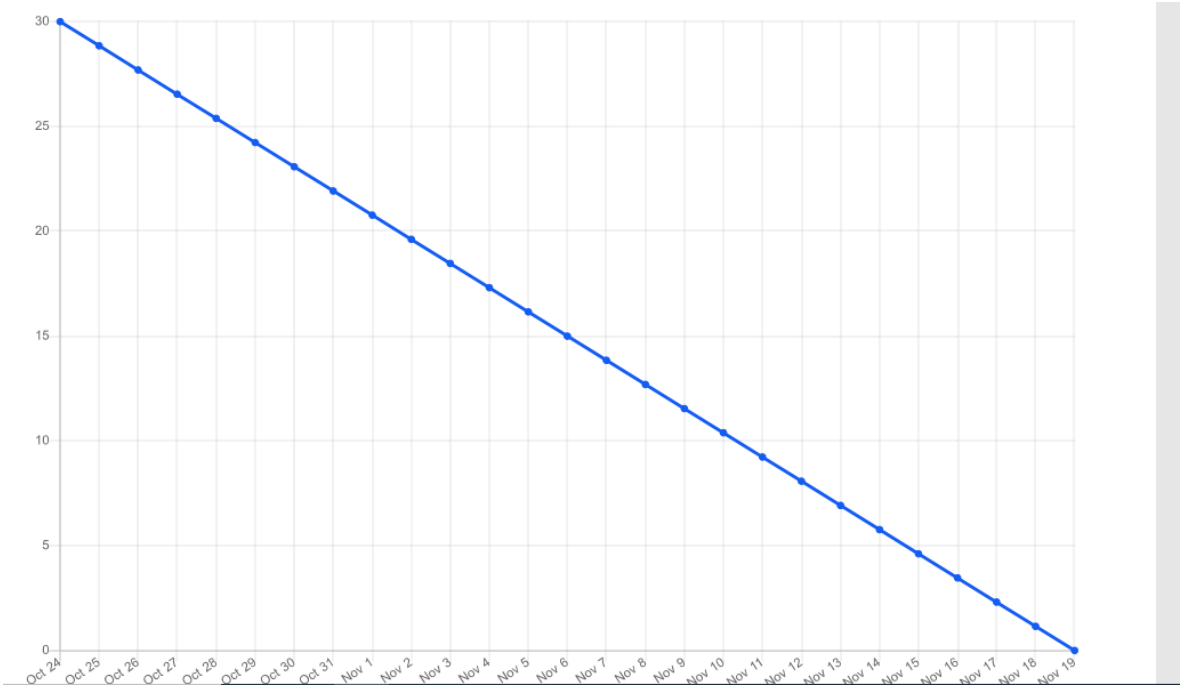
Velocity:

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points perday)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.



MILESTONE AND ACTIVITY LIST

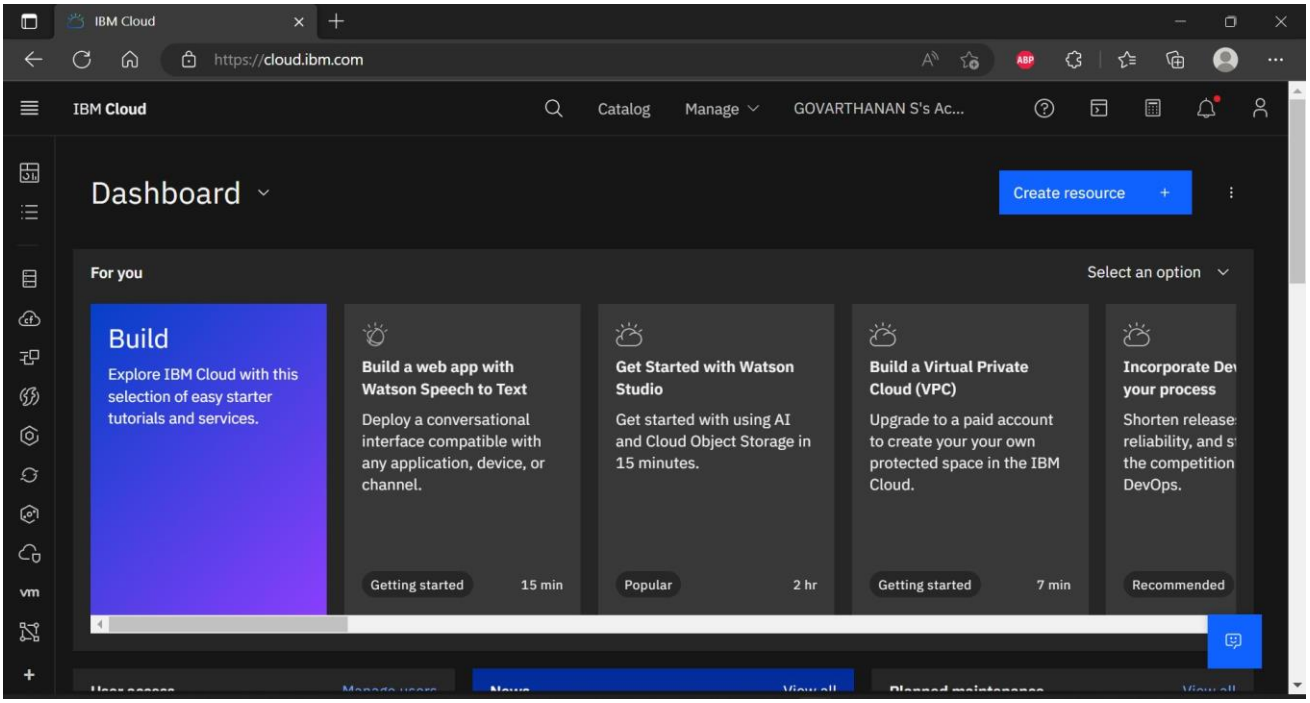
Milestone Name	Activities	Milestone Number	Description	Completion Date	Status
Prerequisites			Create the IBM account and download thenecessary software for the project.	28/09/2022	Completed
Ideation Phase	Literature Survey	1	Literature survey on the selected project byreferring research papers.	29/09/2022	Completed
	Empathy Map	1	Created an empathy map about the customer'sneeds and requirements.	07/10/2022	Completed
	Problem Statement	1	Summarize the problem that customer needs tobe solved.	16/10/2022	Completed
	Brainstorming	1	Gather many different ideas and prioritize theidea based on innovation and possibilities.	11/10/2022	Completed
Project Design Phase - 1	Proposed Solution	2	Prepare the proposed solution that solve the problem statement, which includes feasibility,business model etc.	18/10/2022	Completed

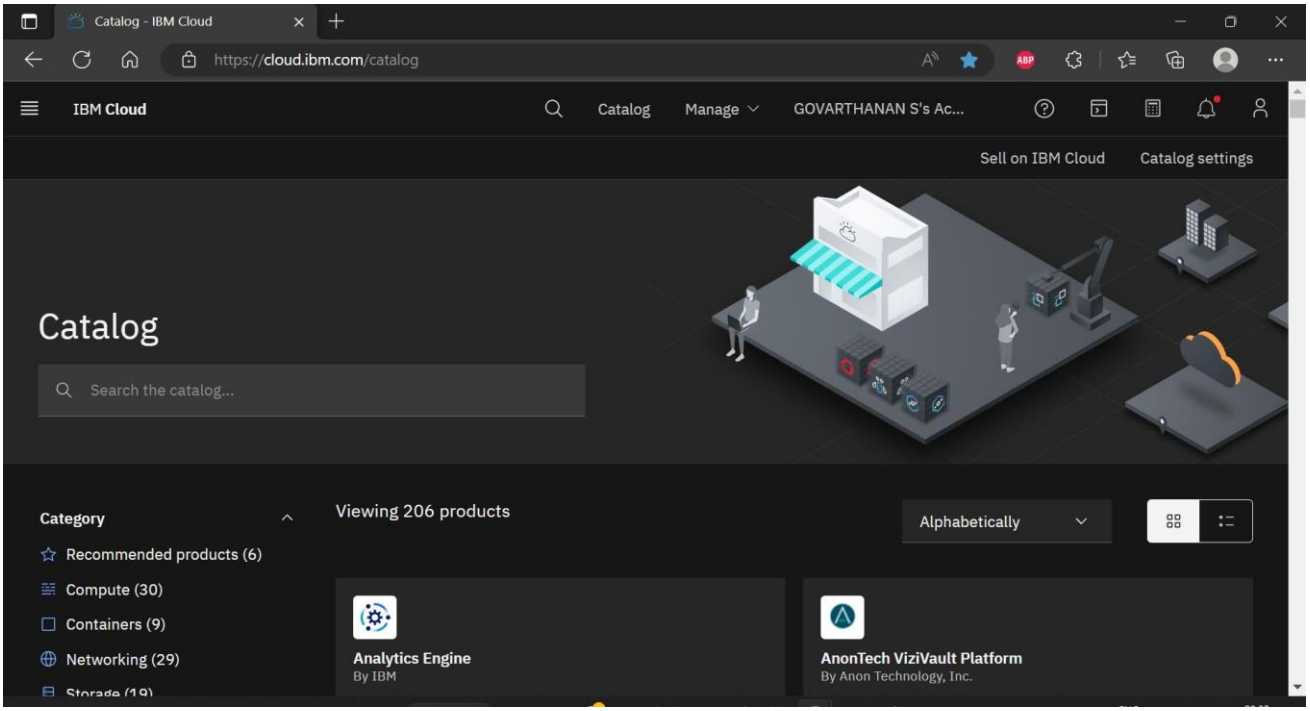
	Solution Architectu re	2	Solution architecture diagram for the proposedsolution	11/10/2022	Completed
	Problem SolutionFit	2	Solution Fit Document for the proposed solution	20/09/2022	Completed
Project Design Phase -2	Customer JourneyMap	3	Prepare a customer journey map to understand, how the customer's experience at each stage ofour process.	19/10/2022	Completed
	Data Flow Diagram	3	Sketch the data flow diagram for our proposedsolution.	19/10/2022	Completed
	Solution Requirement s	3	Create a solution requirement document tosolve the problem statement.	19/10/2022	Completed
	Technology Stack	3	Prepare the technology stack diagram for theproposed solution	19/10/2022	Completed
Project Planning	Milestone AndActivity List	4	Create a document that shows your milestonesand activity in the project development cycle.	12/11/2022	Completed

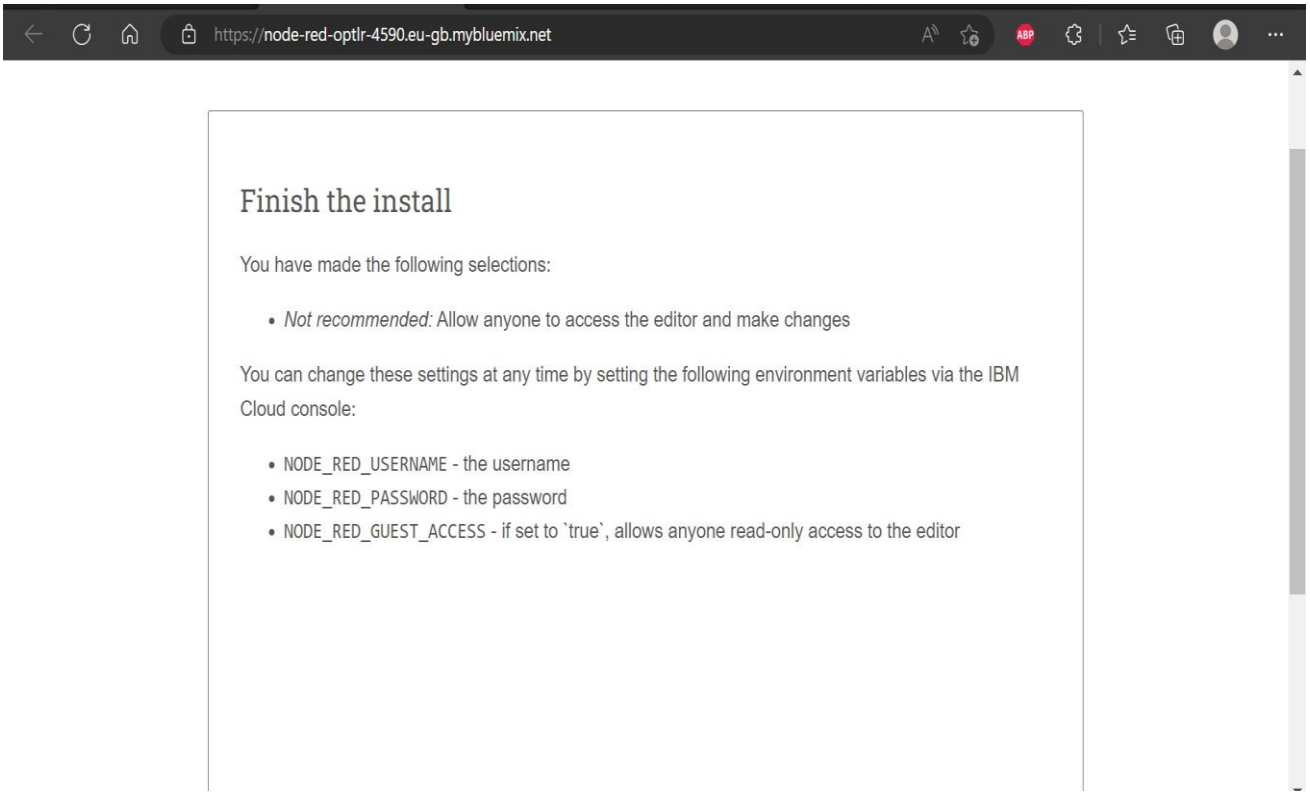
Milestone Name	Activities	Milestone Number	Description	Completion Date	Status
	Sprint Delivery Plan	4	Create a sprint Delivery plan for the projectstatement.	12/11/2022	Completed
Project Development Phase	Sprint-1	5	Delivery of the sprint-1 Phase	15/11/2022	Completed
	Sprint-2	6	Delivery of the sprint-2 Phase	16/11/2022	Completed
	Sprint-3	7	Delivery of the sprint-3 Phase	17/11/2022	Completed
	Sprint-4	8	Delivery of the sprint-4 Phase	19/11/2022	Completed

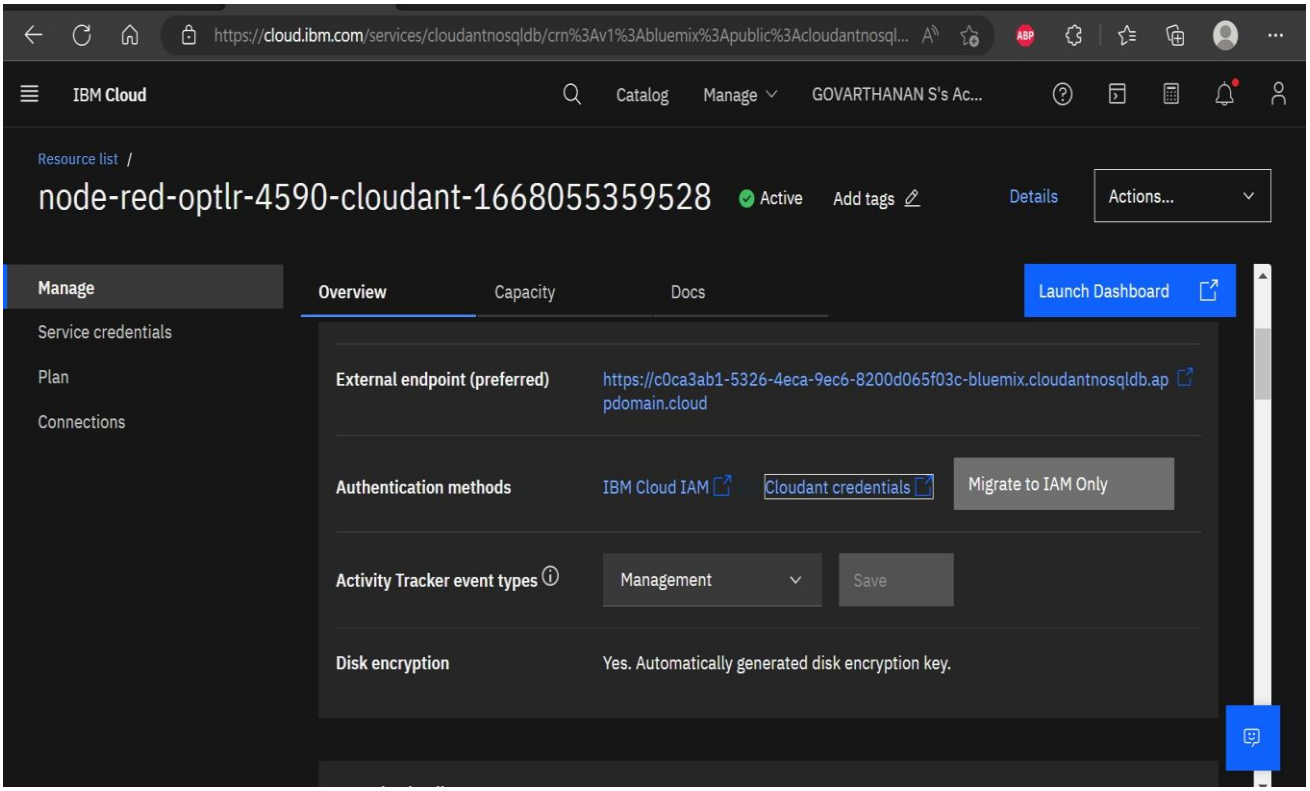
CODING & SOLUTIONING

IBM CLOUD CONFIGURATION:

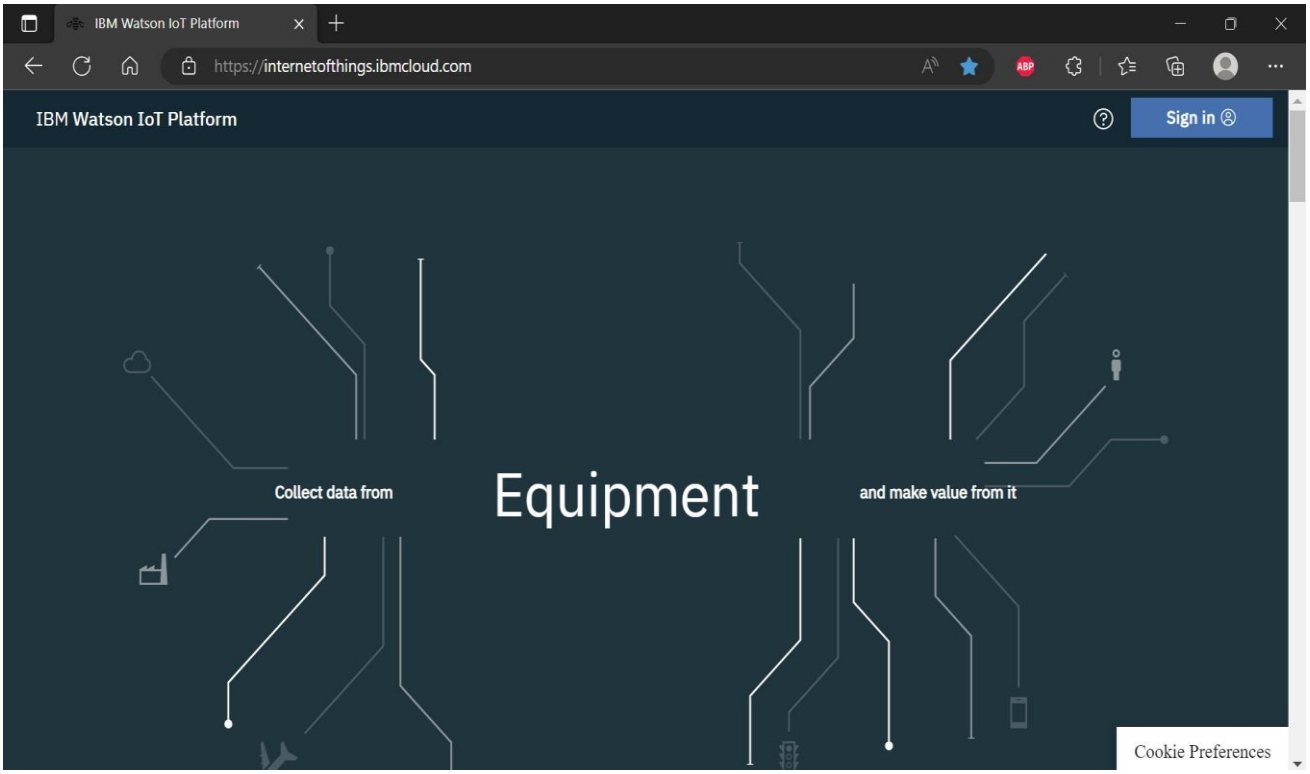


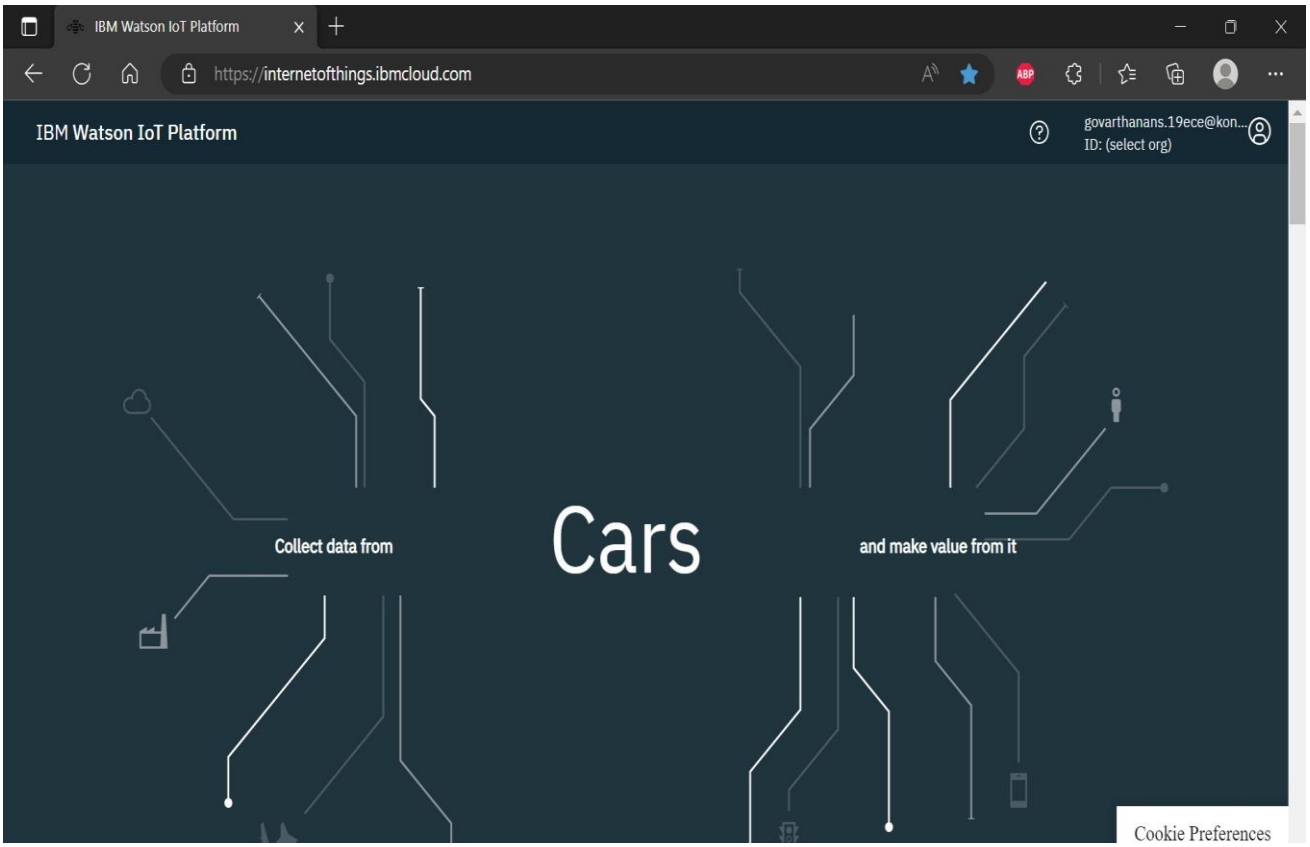


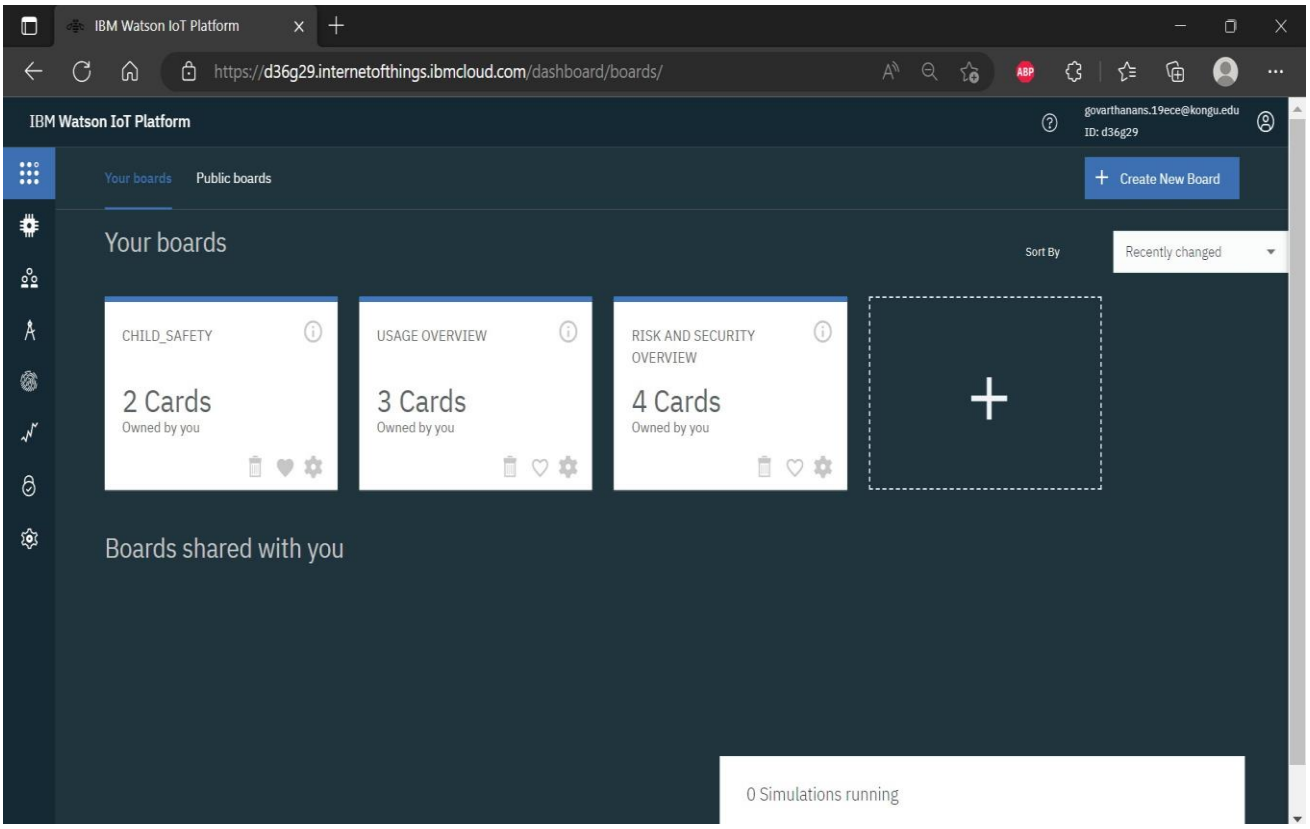

https://node-red-optlr-4590.eu-gb.mybluemix.net
Finish the install
You have made the following selections:
Not recommended: Allow anyone to access the editor and make changes
You can change these settings at any time by setting the following environment variables via the IBM Cloud console:
NODE_RED_USERNAME - the username
NODE_RED_PASSWORD - the password
NODE_RED_GUEST_ACCESS - if set to `true`, allows anyone read-only access to the editor

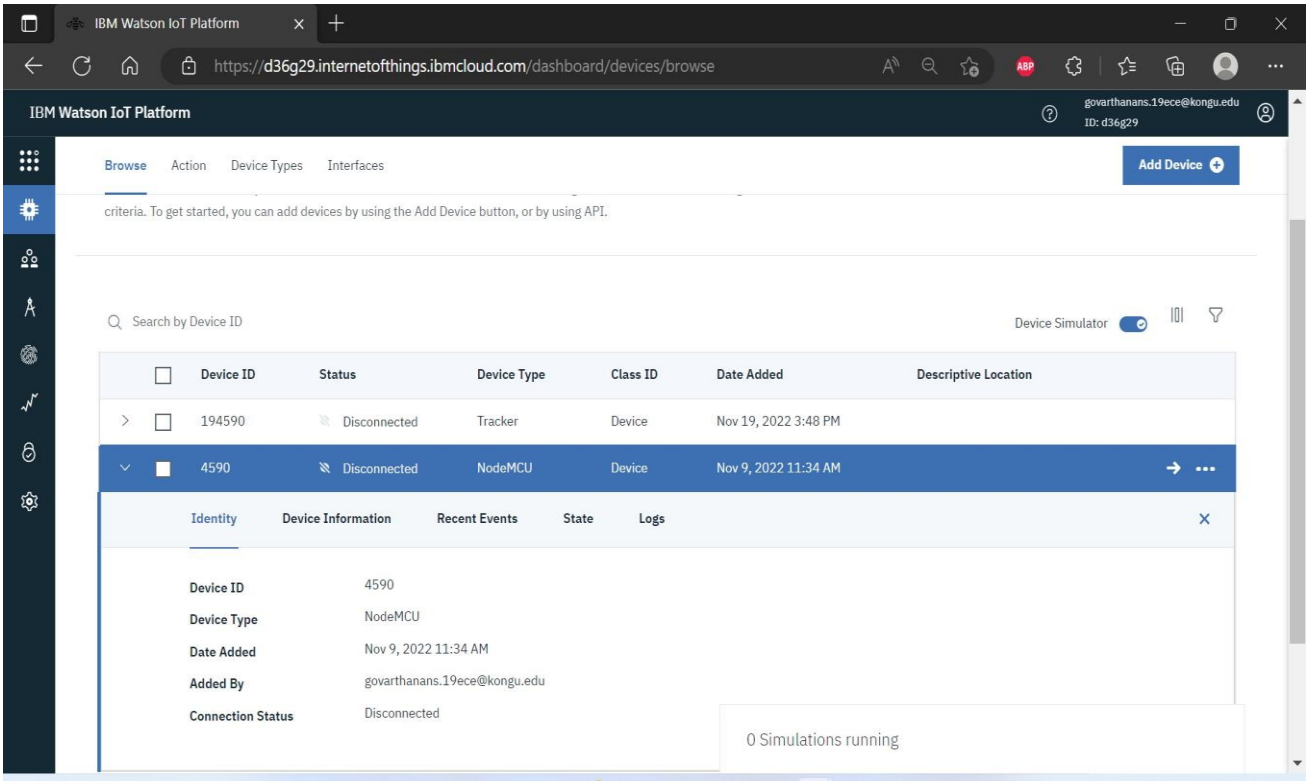

https://cloud.ibm.com/services/cloudantnosqldb/crn%3Av1%3Abluemix%3Apublic%3Acloudantnosql...
IBM Cloud
Catalog
Manage
GOVARTHANAN S's Ac...
Resource list /
node-red-optlr-4590-cloudant-1668055359528
Active
Add tags
Details
Actions...
Manage
Service credentials
Plan
Connections
Overview
Capacity
Docs
Launch Dashboard
External endpoint (preferred)
https://c0ca3ab1-5326-4eca-9ec6-8200d065f03c-bluemix.cloudantnosqldb.appdomain.cloud
Authentication methods
IBM Cloud IAM
Cloudant credentials
Migrate to IAM Only
Activity Tracker event types
Management
Save
Disk encryption
Yes. Automatically generated disk encryption key.

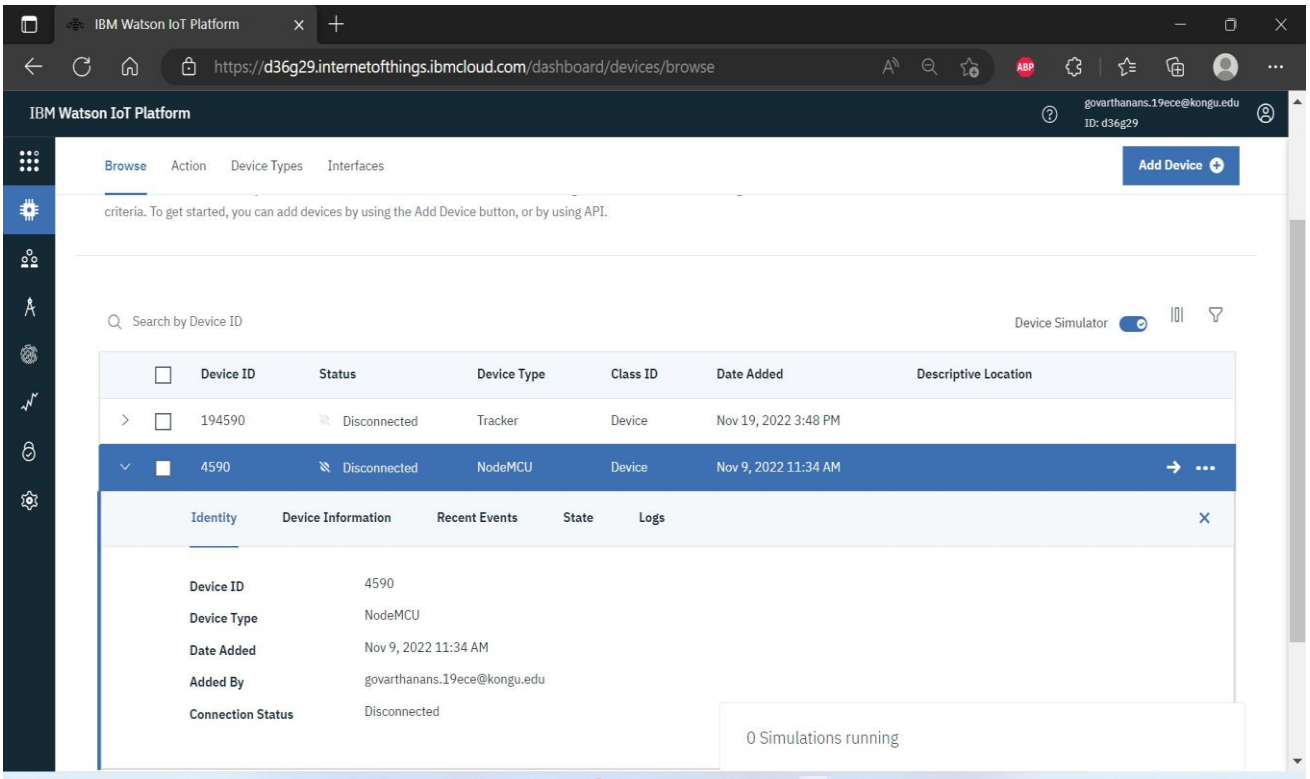
IBM WATSON IOT CONFIGURATION:



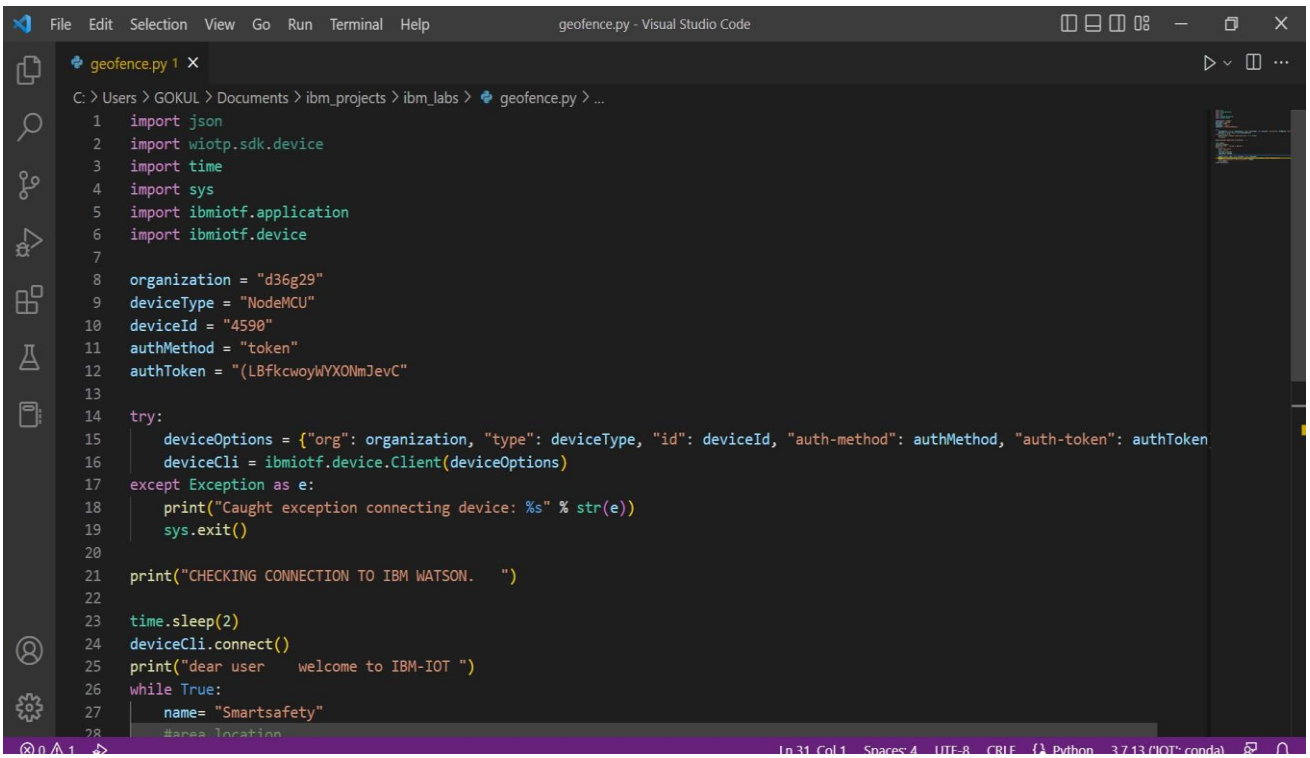



IBM Watson IoT Platform
https://d36g29.internetofthings.ibmcloud.com/dashboard/boards/
IBM Watson IoT Platform
govarthanans.19ece@kongu.edu
ID: d36g29
Your boards
Public boards
Create New Board
Your boards
Sort By
Recently changed
CHILD_SAFETY
2 Cards
Owned by you
USAGE OVERVIEW
3 Cards
Owned by you
RISK AND SECURITY OVERVIEW
4 Cards
Owned by you
Boards shared with you
0 Simulations running

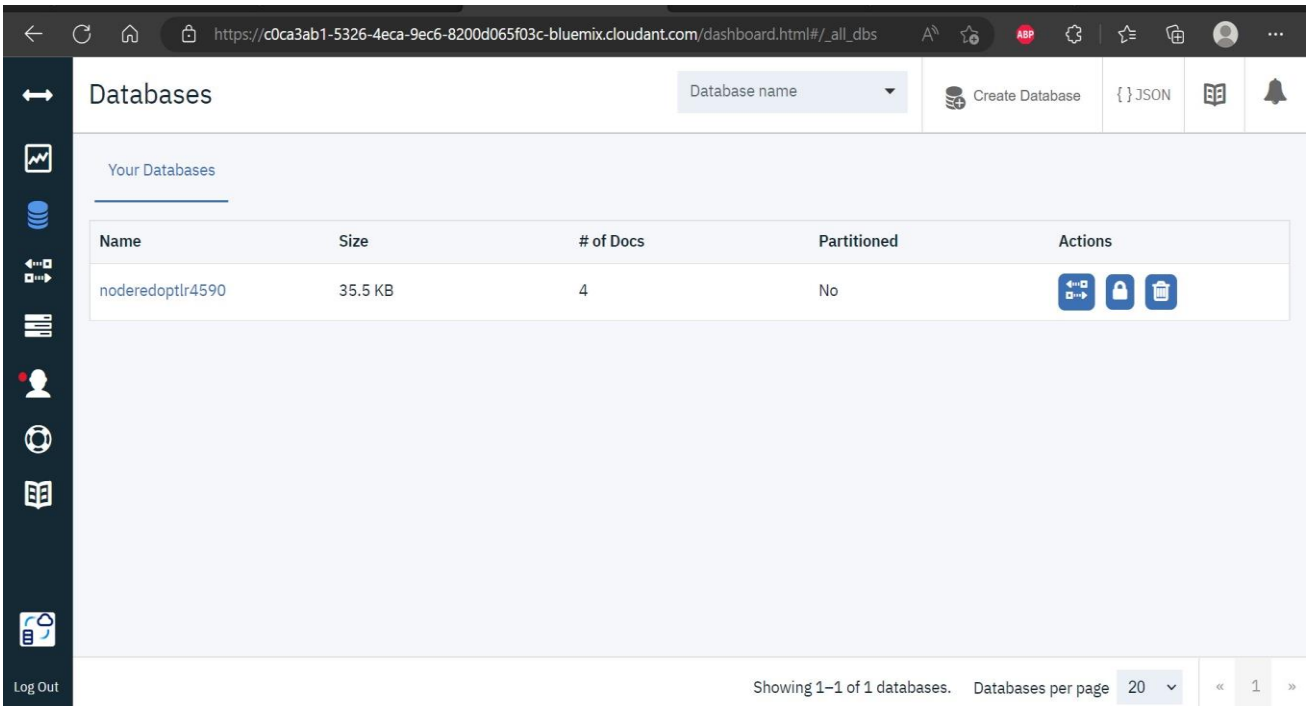

IBM Watson IoT Platform
https://d36g29.internetofthings.ibmcloud.com/dashboard/devices/browse
IBM Watson IoT Platform
govarthanans.19ece@kongu.edu
ID: d36g29
Browse
Action
Device Types
Interfaces
Add Device
criteria. To get started, you can add devices by using the Add Device button, or by using API.
Search by Device ID
Device Simulator
Device ID
Status
Device Type
Class ID
Date Added
Descriptive Location
194590
Disconnected
Tracker
Device
Nov 19, 2022 3:48 PM
4590
Disconnected
NodeMCU
Device
Nov 9, 2022 11:34 AM
Identity
Device Information
Recent Events
State
Logs
Device ID
4590
Device Type
NodeMCU
Date Added
Nov 9, 2022 11:34 AM
Added By
govarthanans.19ece@kongu.edu
Connection Status
Disconnected
0 Simulations running

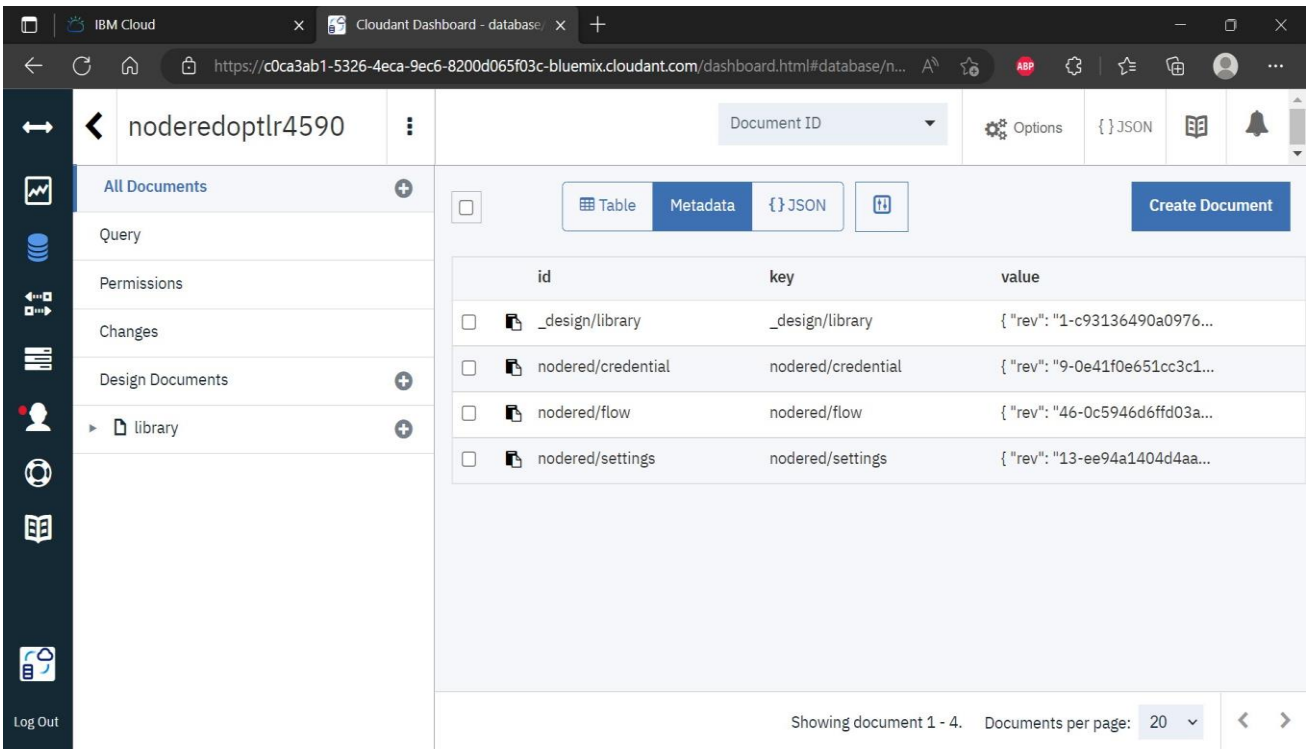


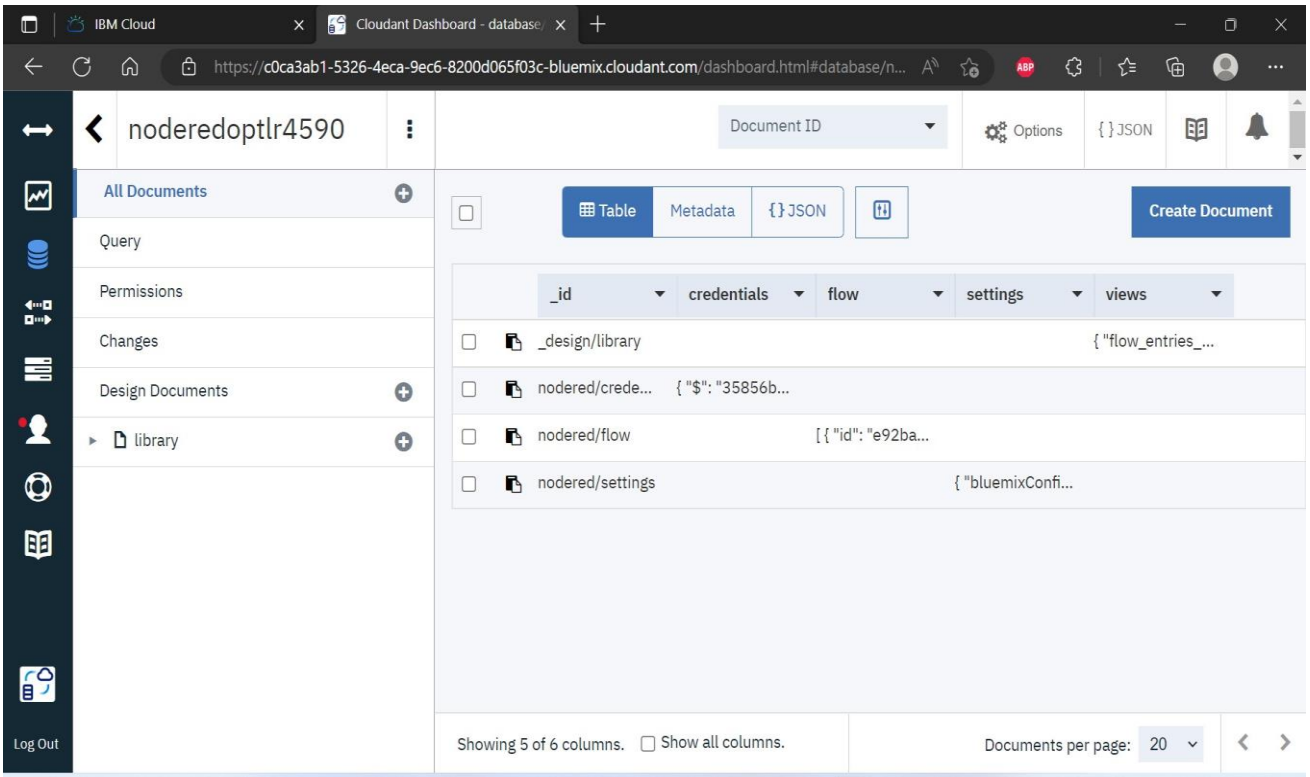
PYTHON PROGRAM:

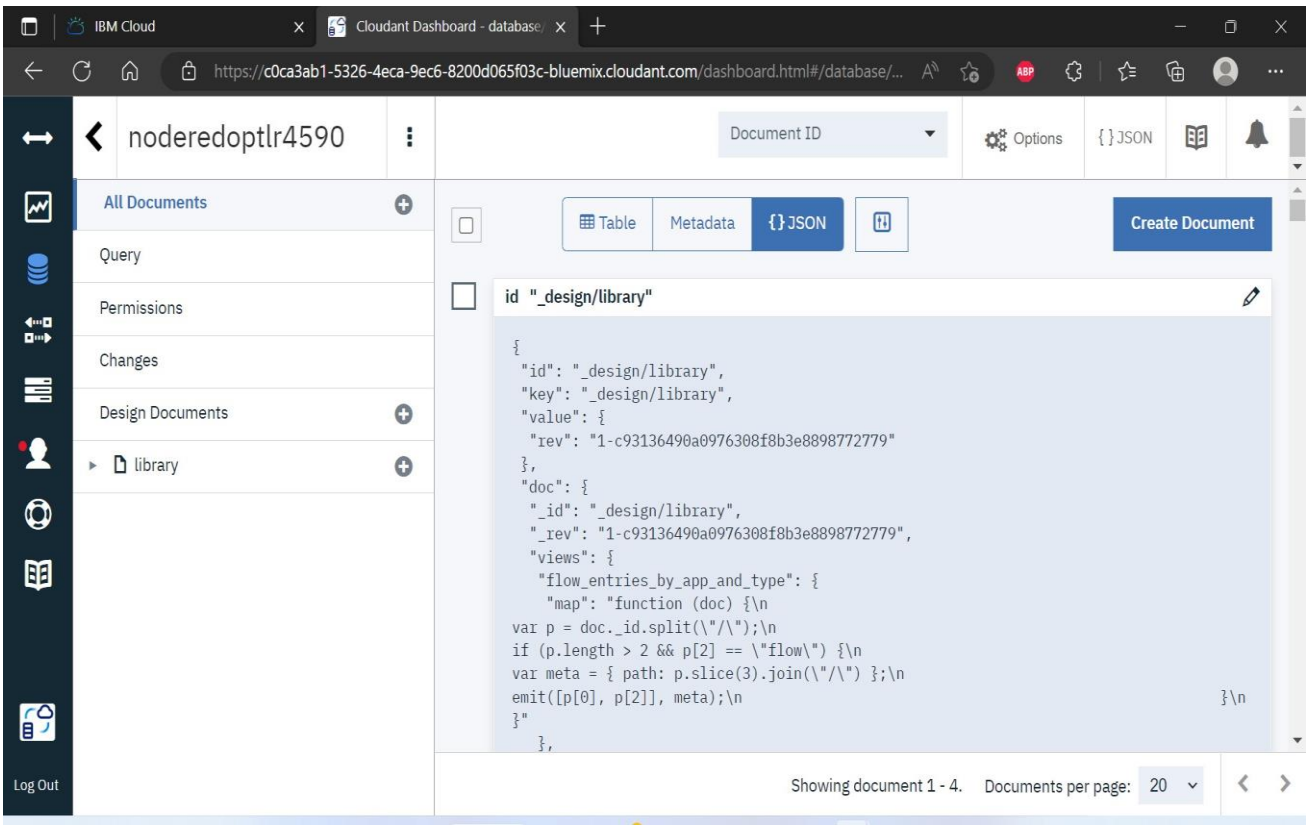


CLOUDANT DB DATABASE:

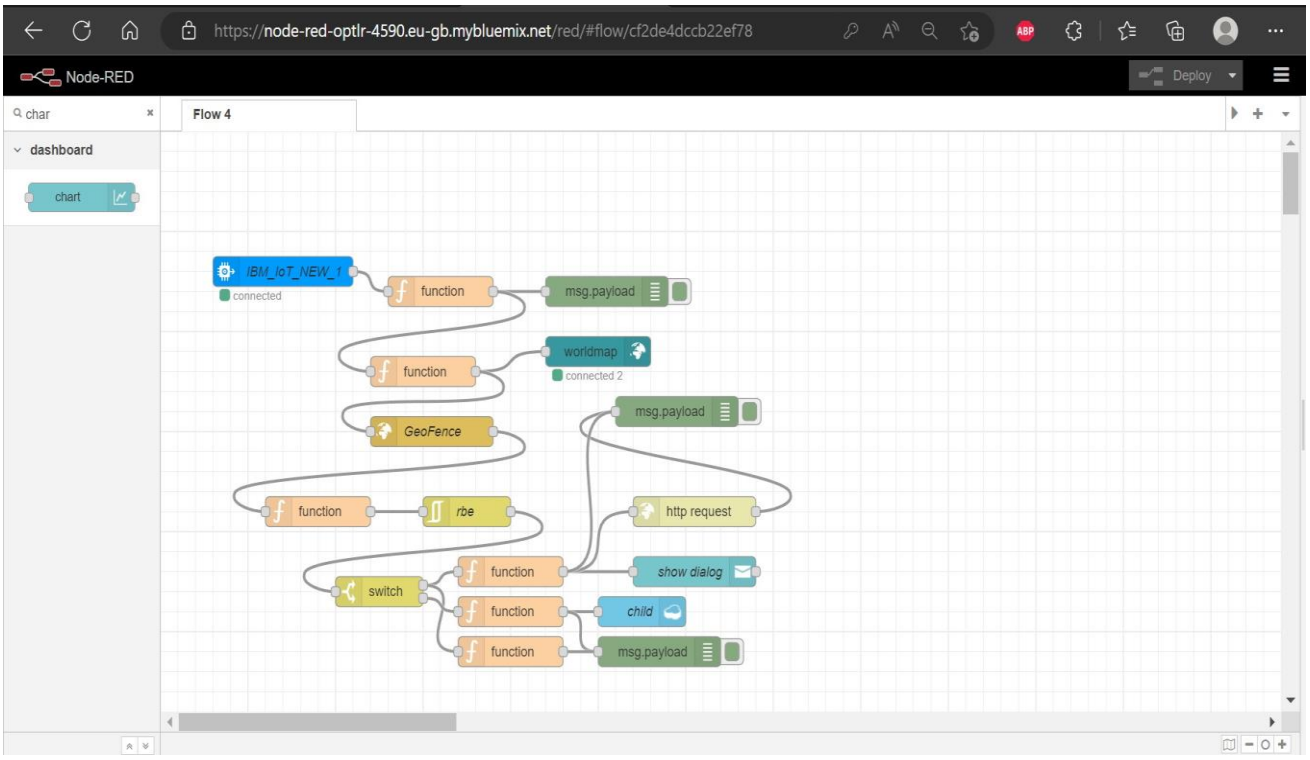


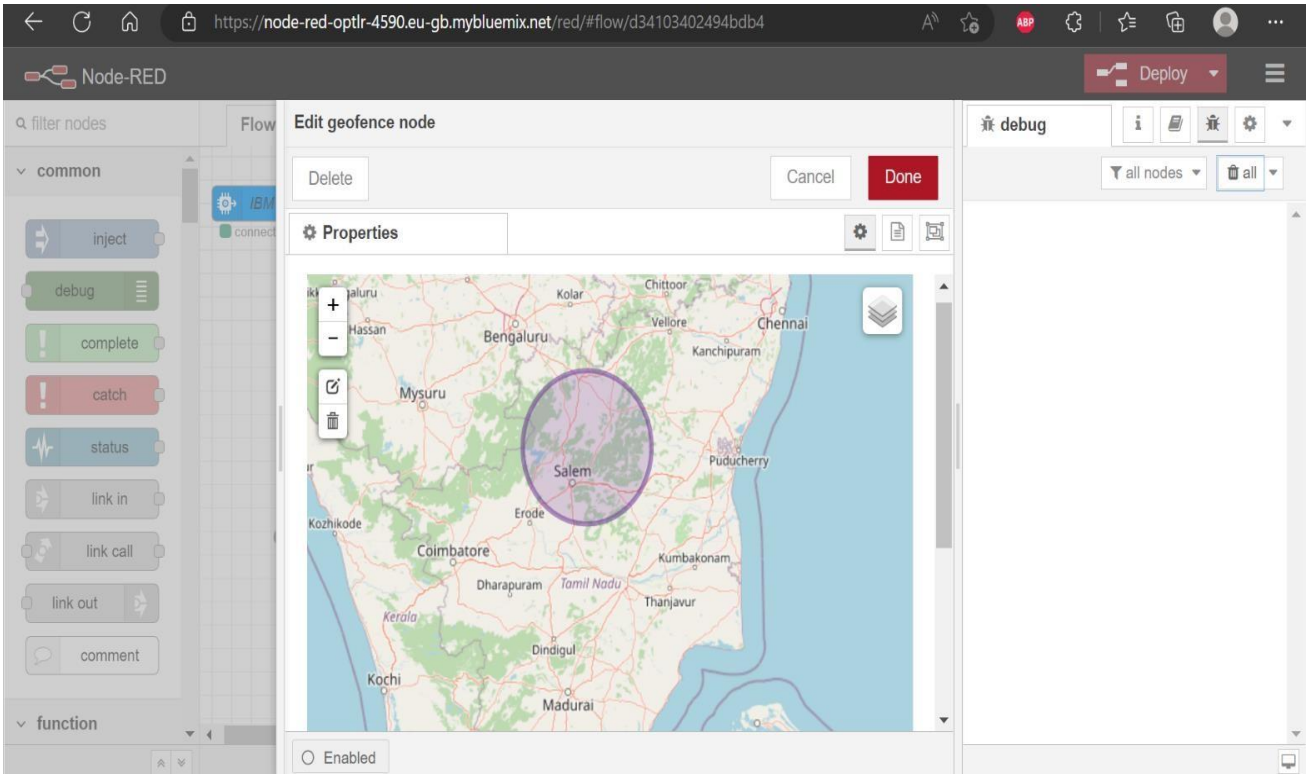



IBM Cloud
Cloudant Dashboard - database
https://c0ca3ab1-5326-4eca-9ec6-8200d065f03c-bluemix.cloudant.com/dashboard.html#database/n...
noderedoptlr4590
Document ID
Options
{ } JSON
All Documents
Query
Permissions
Changes
Design Documents
library
Table
Metadata
{ } JSON
Create Document
_id
credentials
flow
settings
views
_design/library
{ "flow_entries_...
nodered/crede...
{ "$": "35856b...
nodered/flow
[{ "id": "e92ba...
nodered/settings
{ "bluemixConfi...
Log Out
Showing 5 of 6 columns.
Show all columns.
Documents per page:
20

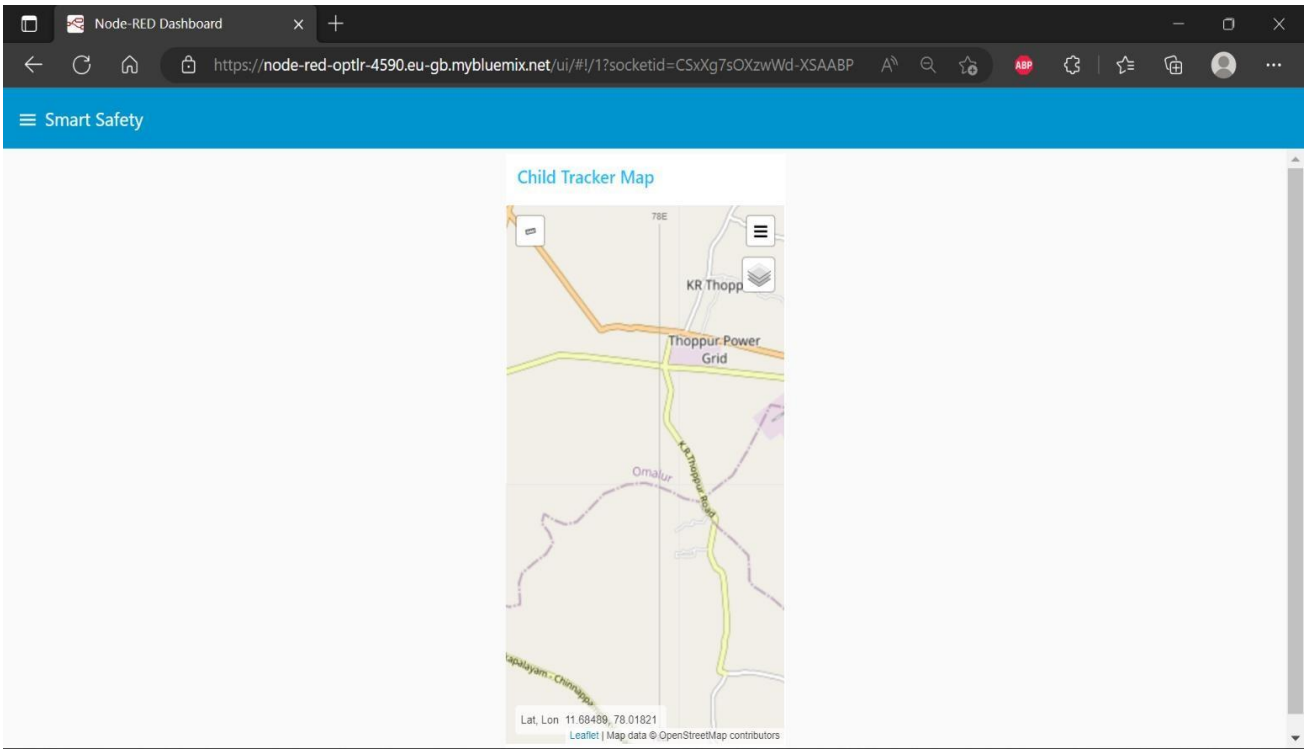

IBM Cloud
Cloudant Dashboard - database
https://c0ca3ab1-5326-4eca-9ec6-8200d065f03c-bluemix.cloudant.com/dashboard.html#/database/...
noderedoptlr4590
Document ID
Options
{ } JSON
All Documents
Query
Permissions
Changes
Design Documents
library
Table
Metadata
{ } JSON
Create Document
id "_design/library"
{
"id": "_design/library",
"key": "_design/library",
"value": {
"rev": "1-c93136490a0976308f8b3e8898772779"
},
"doc": {
"_id": "_design/library",
"_rev": "1-c93136490a0976308f8b3e8898772779",
"views": {
"flow_entries_by_app_and_type": {
"map": "function (doc) {\n
var p = doc._id.split(\"/\");\n
if (p.length > 2 && p[2] == \"flow\") {\n
var meta = { path: p.slice(3).join(\"/\") };\n
emit([p[0], p[2]], meta);\n
}\n
}"
},
Log Out
Showing document 1 - 4.
Documents per page:
20

FLOWCHART IN NODERED:

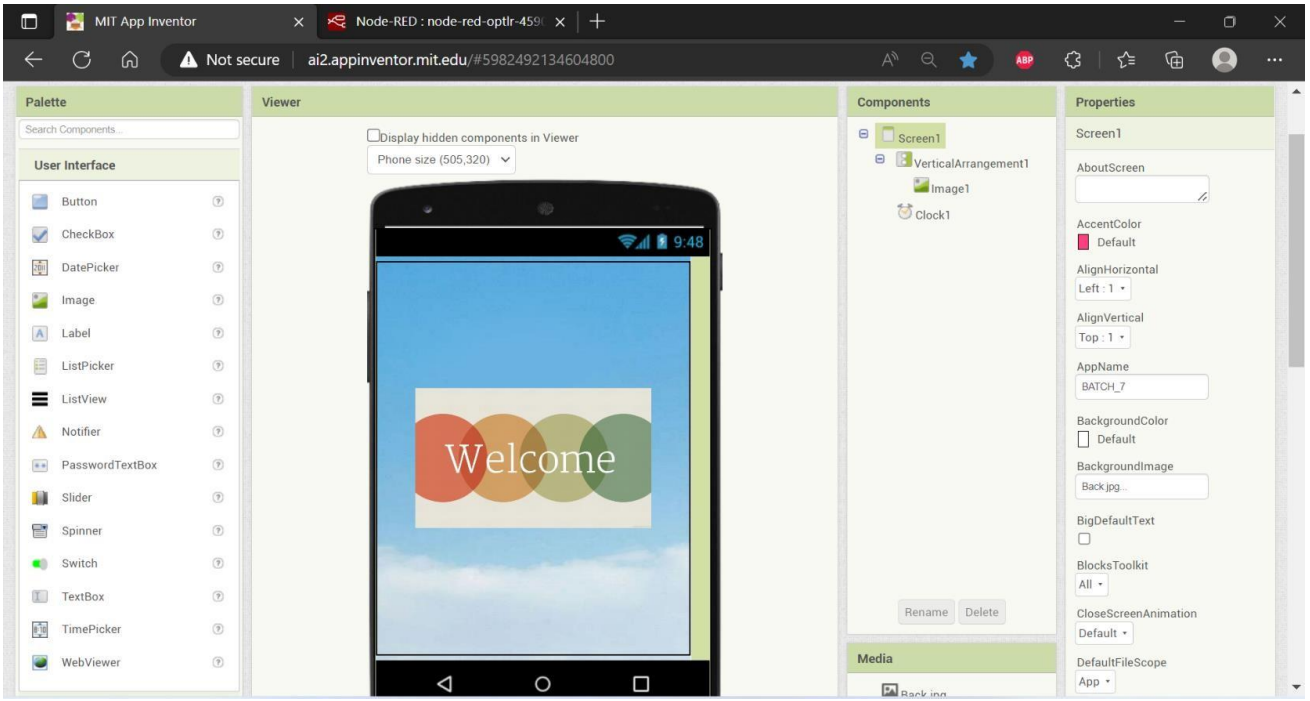


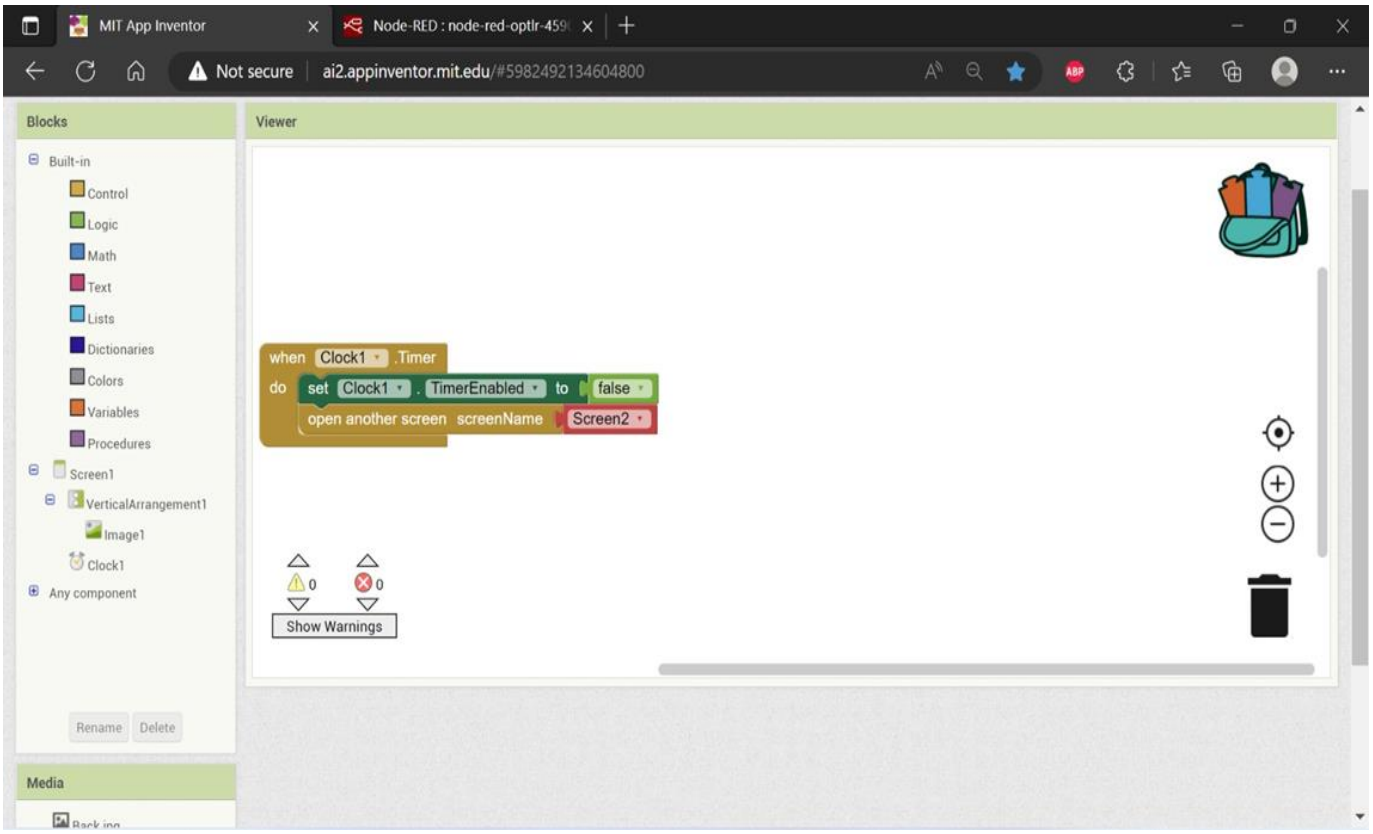


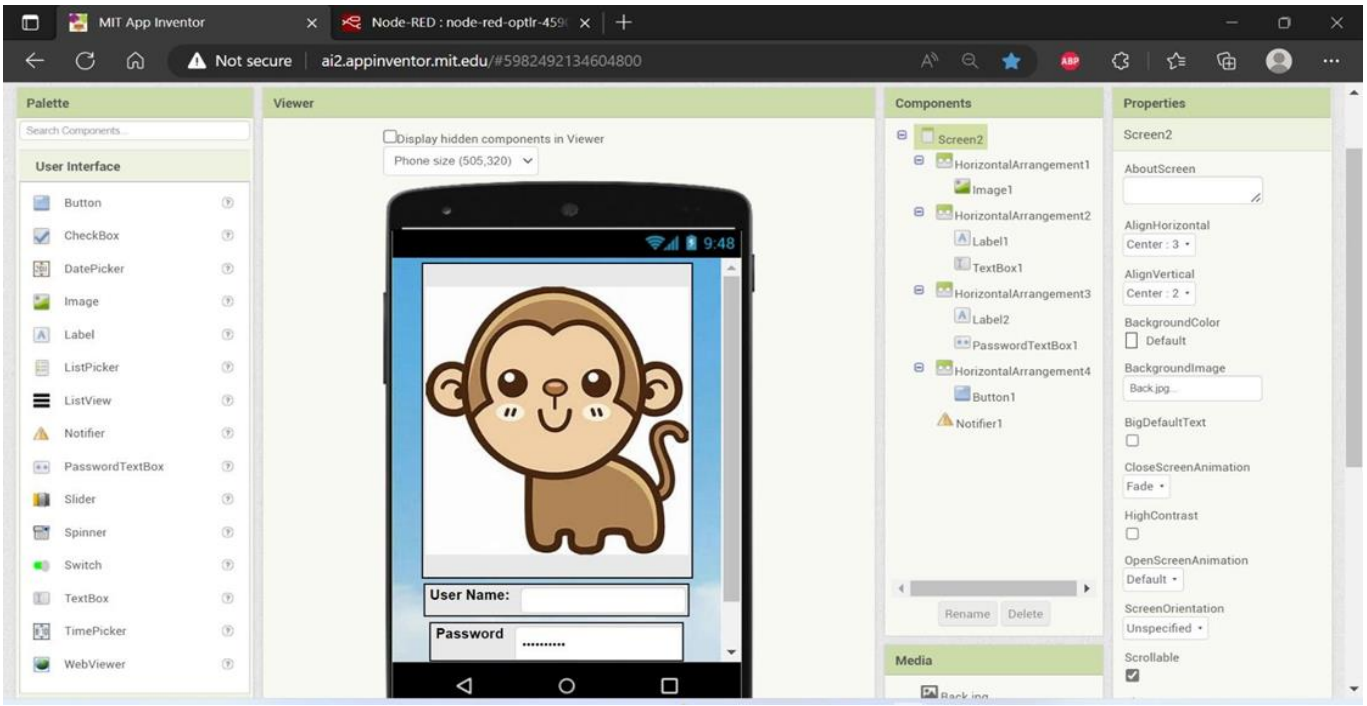
NODERED DASHBOARD:

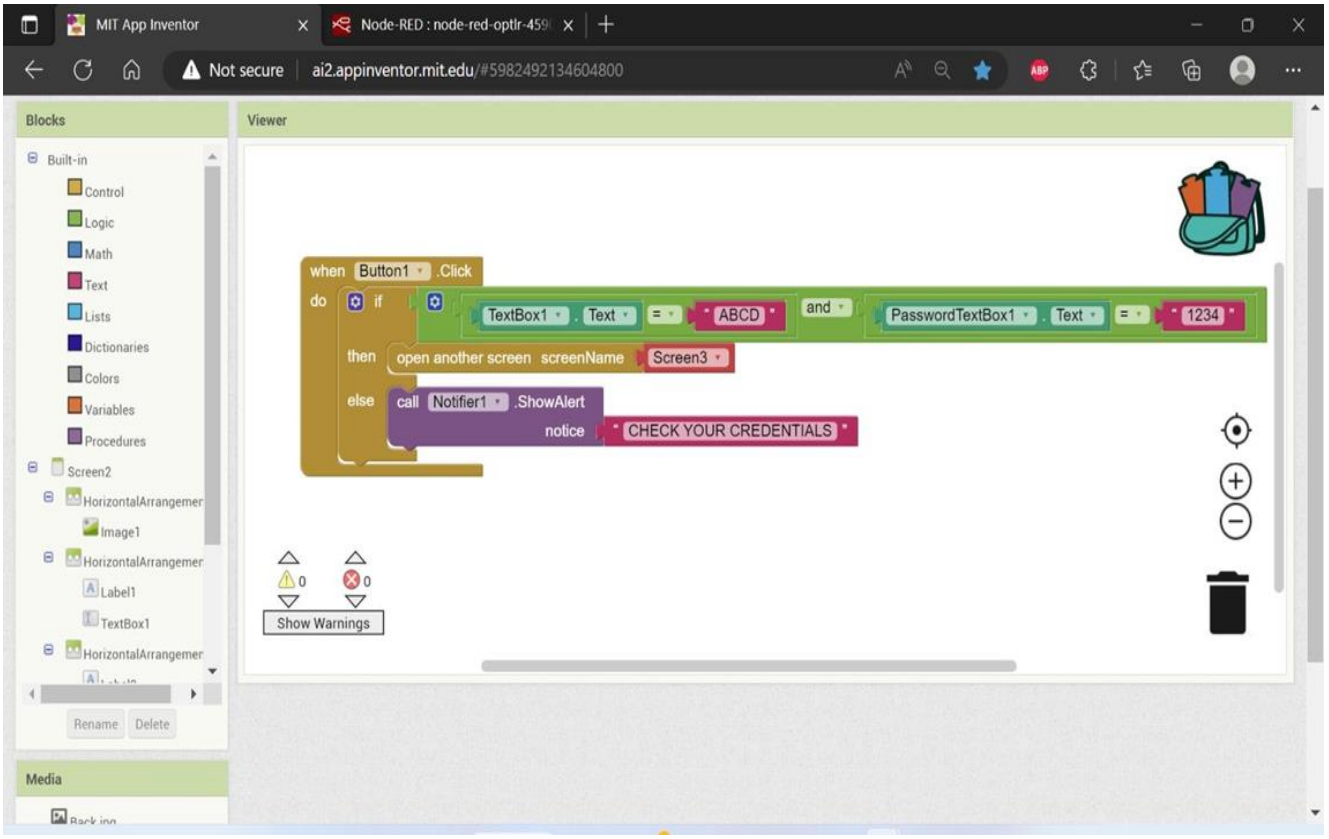


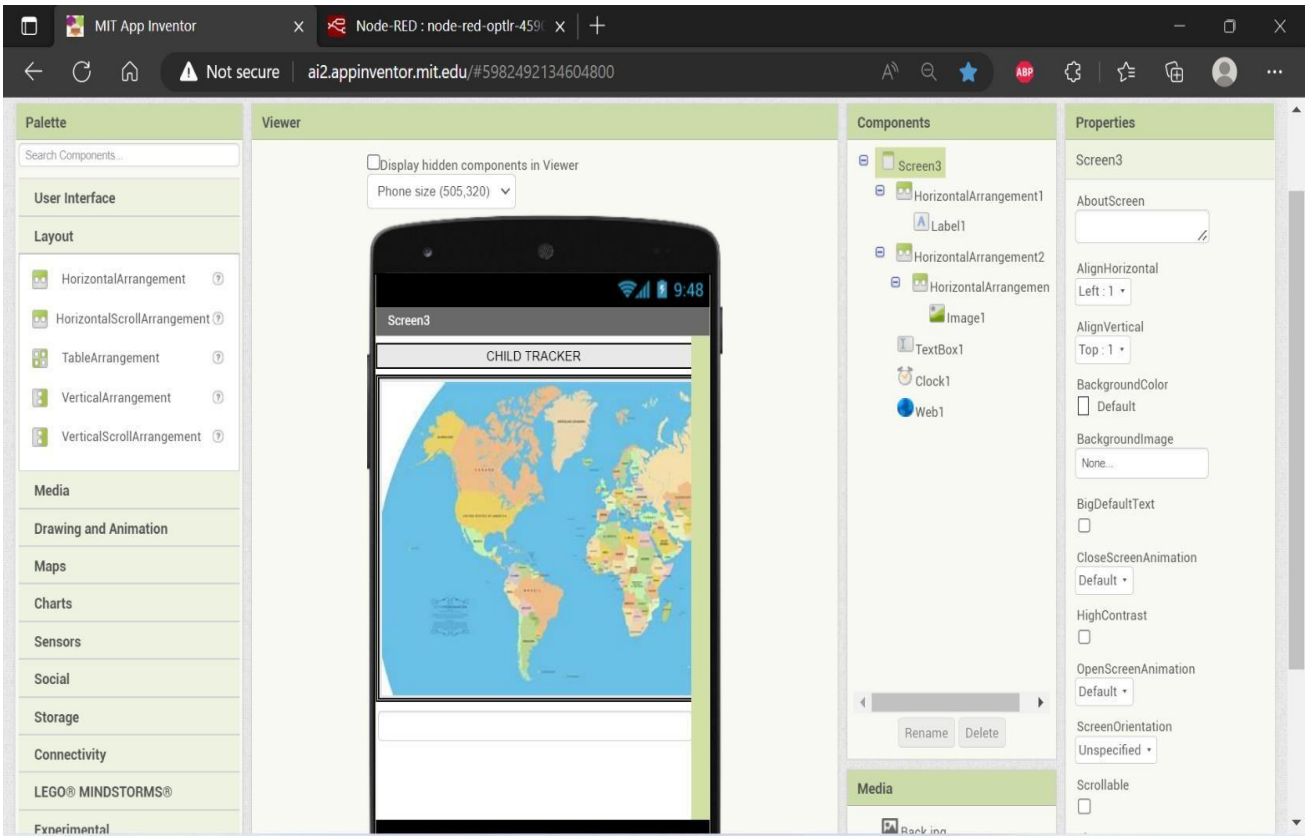
USING MIT APP INVENTOR FOR APPLICATION:

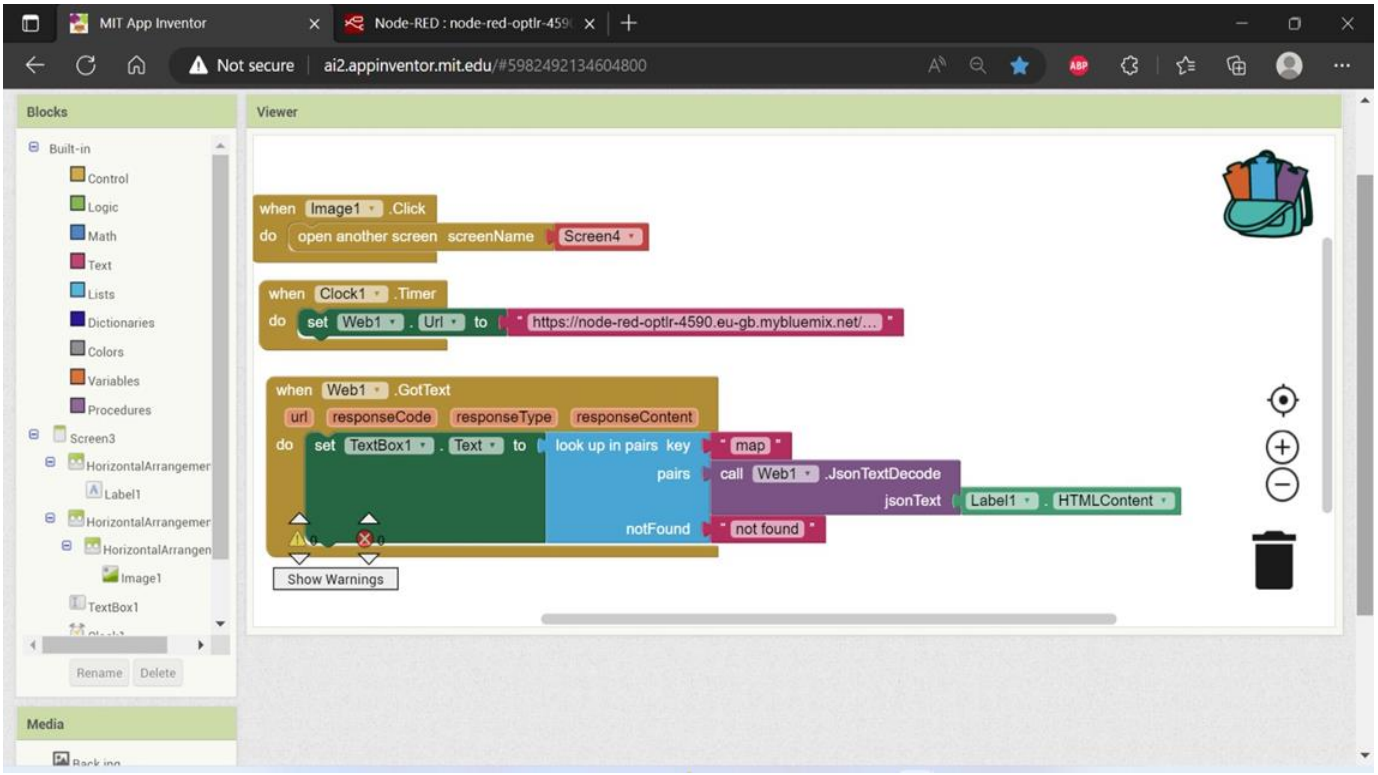


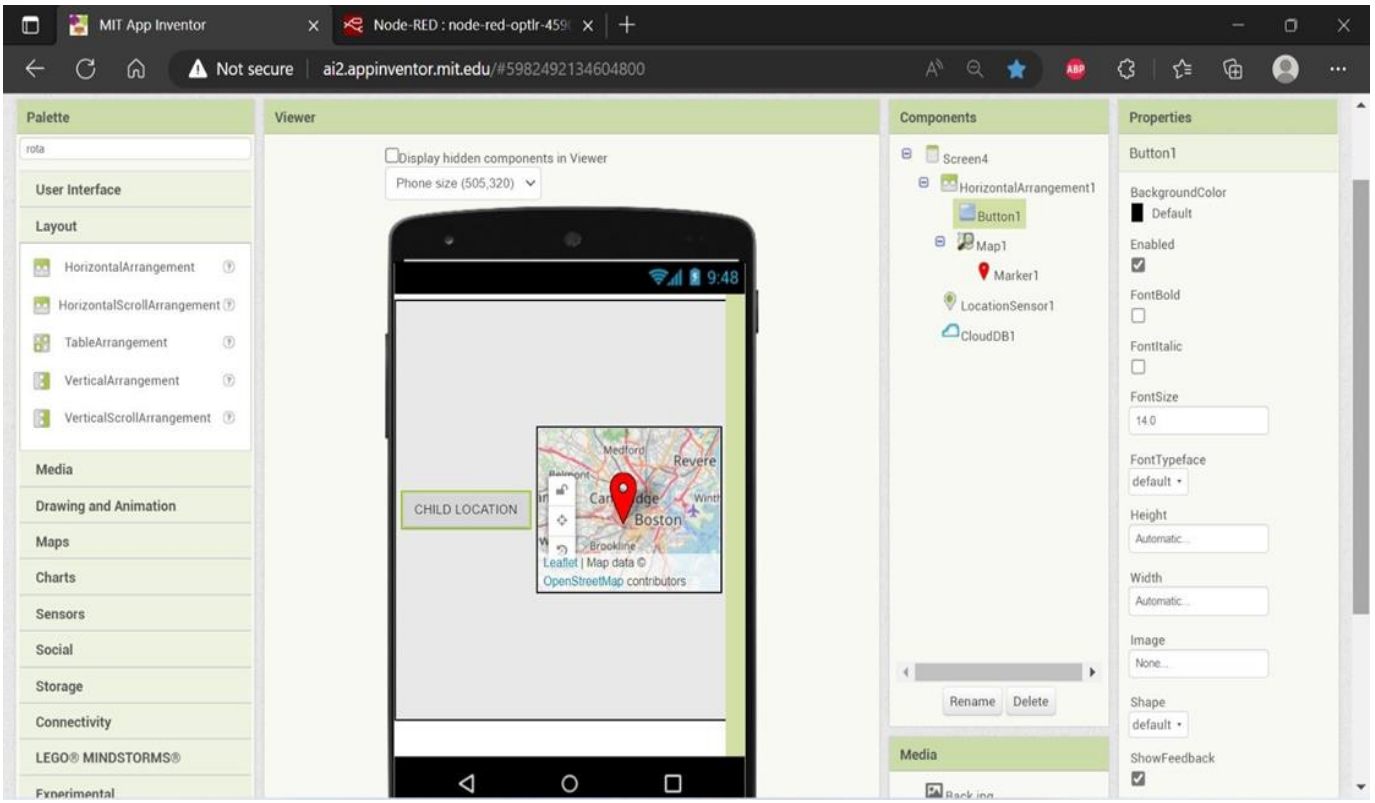

MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen1
VerticalArrangement1
Image1
Clock1
Any component
Rename
Delete
Media
Viewer
when Clock1 .Timer
do set Clock1 . TimerEnabled to false
open another screen screenName Screen2
0
0
Show Warnings

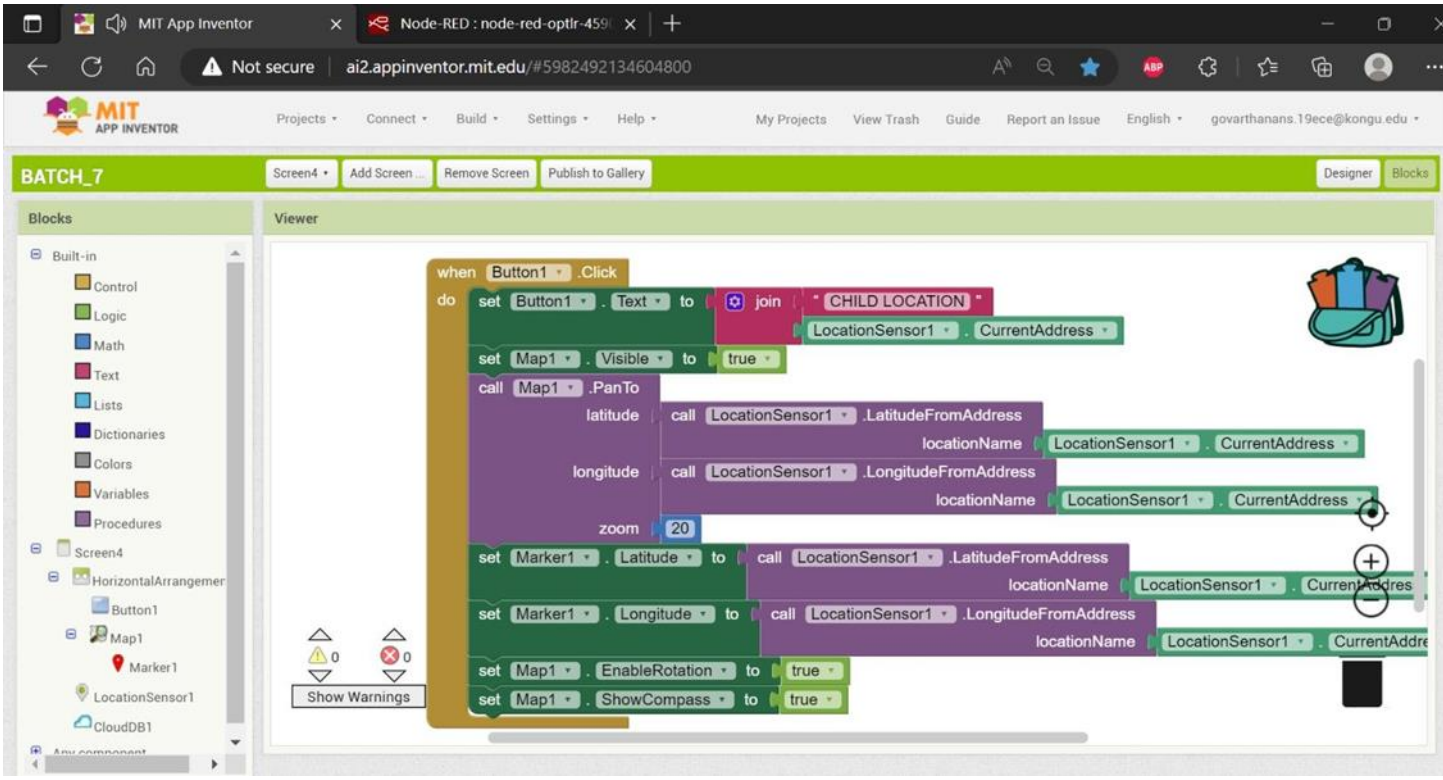

MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
Palette
Search Components...
User Interface
Button
CheckBox
DatePicker
Image
Label
ListPicker
ListView
Notifier
PasswordTextBox
Slider
Spinner
Switch
TextBox
TimePicker
WebViewer
Viewer
Display hidden components in Viewer
Phone size (505,320)
9:48
User Name:
Password
Components
Screen2
HorizontalArrangement1
Image1
HorizontalArrangement2
Label1
TextBox1
HorizontalArrangement3
Label2
PasswordTextBox1
HorizontalArrangement4
Button1
Notifier1
Rename
Delete
Media
Properties
Screen2
AboutScreen
AlignHorizontal
Center : 3
AlignVertical
Center : 2
BackgroundColor
Default
BackgroundImage
Back.jpg
BigDefaultText
CloseScreenAnimation
Fade
HighContrast
OpenScreenAnimation
Default
ScreenOrientation
Unspecified
Scrollable


MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen2
HorizontalArrangemer
Image1
HorizontalArrangemer
Label1
TextBox1
HorizontalArrangemer
Rename
Delete
Media
Viewer
when Button1 .Click
do if TextBox1 . Text = " ABCD " and PasswordTextBox1 . Text = " 1234 "
then open another screen screenName Screen3
else call Notifier1 .ShowAlert
notice " CHECK YOUR CREDENTIALS "
0
0
Show Warnings


MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
Palette
Search Components...
User Interface
Layout
HorizontalArrangement
HorizontalScrollArrangement
TableArrangement
VerticalArrangement
VerticalScrollArrangement
Media
Drawing and Animation
Maps
Charts
Sensors
Social
Storage
Connectivity
LEGO® MINDSTORMS®
Experimental
Viewer
Display hidden components in Viewer
Phone size (505,320)
9:48
Screen3
CHILD TRACKER
Components
Screen3
HorizontalArrangement1
Label1
HorizontalArrangement2
HorizontalArrangemen
Image1
TextBox1
Clock1
Web1
Rename
Delete
Media
Properties
Screen3
AboutScreen
AlignHorizontal
Left : 1
AlignVertical
Top : 1
BackgroundColor
Default
BackgroundImage
None...
BigDefaultText
CloseScreenAnimation
Default
HighContrast
OpenScreenAnimation
Default
ScreenOrientation
Unspecified
Scrollable


MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
Blocks
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen3
HorizontalArrangemer
Label1
HorizontalArrangemer
HorizontalArrangen
Image1
TextBox1
Rename
Delete
Media
Viewer
when Image1 .Click
do open another screen screenName Screen4
when Clock1 .Timer
do set Web1 . Url to " https://node-red-optlr-4590.eu-gb.mybluemix.net/... "
when Web1 .GotText
url responseCode responseType responseContent
do set TextBox1 . Text to look up in pairs key " map "
pairs call Web1 .JsonTextDecode
jsonText Label1 . HTMLContent
notFound " not found "
Show Warnings


MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
Palette
rota
User Interface
Layout
HorizontalArrangement
HorizontalScrollArrangement
TableArrangement
VerticalArrangement
VerticalScrollArrangement
Media
Drawing and Animation
Maps
Charts
Sensors
Social
Storage
Connectivity
LEGO® MINDSTORMS®
Experimental
Viewer
Display hidden components in Viewer
Phone size (505,320)
9:48
CHILD LOCATION
Medford
Revere
Boston
Brookline
Leaflet | Map data ©
OpenStreetMap contributors
Components
Screen4
HorizontalArrangement1
Button1
Map1
Marker1
LocationSensor1
CloudDB1
Rename
Delete
Media
Properties
Button1
BackgroundColor
Default
Enabled
FontBold
FontItalic
FontSize
14.0
FontTypeface
default
Height
Automatic...
Width
Automatic...
Image
None...
Shape
default
ShowFeedback


MIT App Inventor
Node-RED : node-red-optlr-459
Not secure
ai2.appinventor.mit.edu/#5982492134604800
MIT APP INVENTOR
Projects
Connect
Build
Settings
Help
My Projects
View Trash
Guide
Report an Issue
English
govarthanans.19ece@kongu.edu
BATCH_7
Screen4
Add Screen ...
Remove Screen
Publish to Gallery
Designer
Blocks
Blocks
Viewer
Built-in
Control
Logic
Math
Text
Lists
Dictionaries
Colors
Variables
Procedures
Screen4
HorizontalArrangemer
Button1
Map1
Marker1
LocationSensor1
CloudDB1
when Button1 .Click
do
set Button1 . Text to join " CHILD LOCATION "
LocationSensor1 . CurrentAddress
set Map1 . Visible to true
call Map1 .PanTo
latitude call LocationSensor1 .LatitudeFromAddress
locationName LocationSensor1 . CurrentAddress
longitude call LocationSensor1 .LongitudeFromAddress
locationName LocationSensor1 . CurrentAddress
zoom 20
set Marker1 . Latitude to call LocationSensor1 .LatitudeFromAddress
locationName LocationSensor1 .
set Marker1 . Longitude to call LocationSensor1 .LongitudeFromAddress
locationName LocationSensor1 .
set Map1 . EnableRotation to true
set Map1 . ShowCompass to true
0
0
Show Warnings

TESTING

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 is shown in the card.
5. Verify the events is stored in the database.
6. Verify to create a node -red services.
7. To create a web UI to interact with user.
8. To send SMS to the particular child's guardian.
9. Verify user is able to log into app with Valid credentials.
10. Verify it show the location in app.

User Acceptance Testing

1.Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [IoT Based Safety Gadget For Child Safety Monitoring & Notification] project at the time of the release to User Acceptance Testing (UAT).

1. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, andhow 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

2. 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

RESULTS

Performance Metrics

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

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.

ADVANTAGES & DISADVANTAGES

Advantages:

1. **Peace of mind for parents**

Parents no longer need to ring their child continuously, thus causing them to feel embarrassed, or interrupting their play and exploration.

Location tracking can also ease unnecessary worry if a child doesn't answer the phone straight away - through GPS tracking, a parent can receive a quick update and put their mind to rest.

2. **Gives kids more freedom**

It gives children more freedom because when parents know where the children are, means they're more relaxed about letting the kids go further afield.

3. **Reassurance for children**

Location tracking can also be reassuring for the child, particularly if they get lost - this is especially useful if a child wanders off in a crowded place.

4. **Know the current location**

Our Kids GPS Tracker provides real-time location of your children. You can track thelive locations of your kids, where they are and what they are doing.

5. **Get geofence details of kids at any time**

Send alert Notification to the parents if their children cross the geofence.

Disadvantage

1.Kids may become more secretive

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.

1.They don't become streetwise

Young people run the risk of not learning to be independent and safe on their own.

2. Internet and social media access

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 cyber bullying, inappropriate contact with strangers and unsupervised access to inappropriate information.

3.Trust issues

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.

CONCLUSION

This Project demonstrates smart IoT devices for child safety tracking and monitoring,to help the parents to locate and monitor their children.

We have integrate IBM Watson Iot Platform in order to get this location details (i.e. latitude & longitude) from python program and we also integrate Fast SMS service in order to send an alert to guardian/ parent.

The system also consists of mobile app and send all the monitored parameters to cloud onparental phone.

FUTURE SCOPE

This system can be further enhanced by installation of mini-camera inside smart gadget for better security so that live footage can be seen on parental phone during panic situations. GPS device come with a panic button that let your child alert you when something wrong or they need help. The system can be modified by installation of small solar panels for charging the battery of smart gadget to gain maximum battery backup.

APPENDIX

SOURCE CODE

Git hub link: https://github.com/IBM-EPBL/IBM-Project-22524-1659853538

Demo link:

https://www.loom.com/share/275f24b928104aeda53bb5a184c9b96a