

IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

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IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

INTRODUCTION

1.1 Project Overview

The internet of things (IoT) refers to the set of devices and system that stay interconnected with real-world sensor and to the internet. During years' Child safety is under threat and it is very important to provide a technology-based solution which will help them under panic situations and monitor them using a smart gadget. The proposed system is equipped with GSM and GPS modules for sending and receiving call and SMS between safety gadget and parental phone, the proposed system also consists of Wi-Fi module used to implement IoT and send all the monitoring parameters to the cloud for android app monitoring on parental phone. Android application can be used to track the current location of safety gadget using its location coordinates on parental phone android app and also via SMS request from parent phone to safety gadget

1.2 Purpose

Nowadays, crime rate associated with children keeps increasing due to which draws peoples' attention regarding child safety. This research is conducted to propose a child security smart band utilizing IoT technology. Online questionnaire and semi-structured interview are methodologies used to collect data. The online questionnaire gains feedbacks by sending questions electronically, where answers need to be submitted online. In the semi structured interview, researcher meets and asks respondents some predetermined questions while other being asked are not planned in advanced. The future improvements of this device will be adding functions and software to make it works like a phone such as messaging, gallery, Google, YouTube, meanwhile, adding more child security features so that child safety is guaranteed.

Literature Survey

2.1 Existing Problem

IoT has been applied in domains such as smart home, smart city, smart factory, supply chain, retail, agriculture, lifestyle, transportation, emergency, health care, environment, energy, culture and tourism. However, it is seldom used to monitor child's safety. There are many more previously existing systems of IoT-based safety gadgets for child safety monitoring and notification. In the existing system, we use a voice recognition module in which the alert commands from the child are stored and kept for further reference. If the same child delivers the same command, it will compare with the alert command which was previously stored and sets an emergency level according to the alert command. The GSM has a SIM which is used to send an alert message or an alert call to the trusted people.

2.2 References

1. Authors: M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari. Published in: 2019.

Title: Smart IoT Device for Child Safety and Tracking.

2. Authors: Aditi Gupta, Vibhor Harit. Published in: 2016.

Title: Child Safety & Tracking Management System by using GPS.

3. Authors: Dheeraj Sunehera, Pottabhatini Laxmi Priya. Published in: 2016.

Title: Children Location Monitoring on Google Maps using GPS and GSM.

4. Authors: Pramod, M Uday Bhaskar, Ch V and Shikha, K. (January 2018) Title: IOT wearable device for the safety and security of women and girl.

2.3 Problem Statement Definition

People with disabilities are a part of our society. Even though technology is constantly evolving, little is being done to improve the lives of these people. Communication with a deaf-mute person has always been difficult. Because hand sign language is not taught to the general public, it can be difficult for silent people to communicate with non-mute people. In times of crisis, they may find it difficult to communicate. When other modes of communication, such as speech, are unavailable, the human hand has remained a popular method of information transmission. A voice conversion system with hand gesture recognition and translation will be very helpful in establishing proper communication between a normal person and a handicapped person in any language.

3.1 Empathy Map Canvas



- Creation of mobile application
- Integration with smart watch
- Geofencing the child's movements
- Satellite call to child in case of emergency

- Creation of web application
- Integration with mobile as PWA
- Geofencing child's movements through APIs
- RFID based additional tracking

- Brilliant UI/UX design for web application
- Good UI/UX design for mobile application
- Smart design of smart watches
- Integration with Cloud services
- Creation of any application
- Integration with parent's mobile
- Integration with police in case of emergency

Priyanka M

- RFID based home in and out tracking
- RFID based tracking for school
- GPS integrated bag/watch
- GPS integrated shoe
- Creation of any end user application

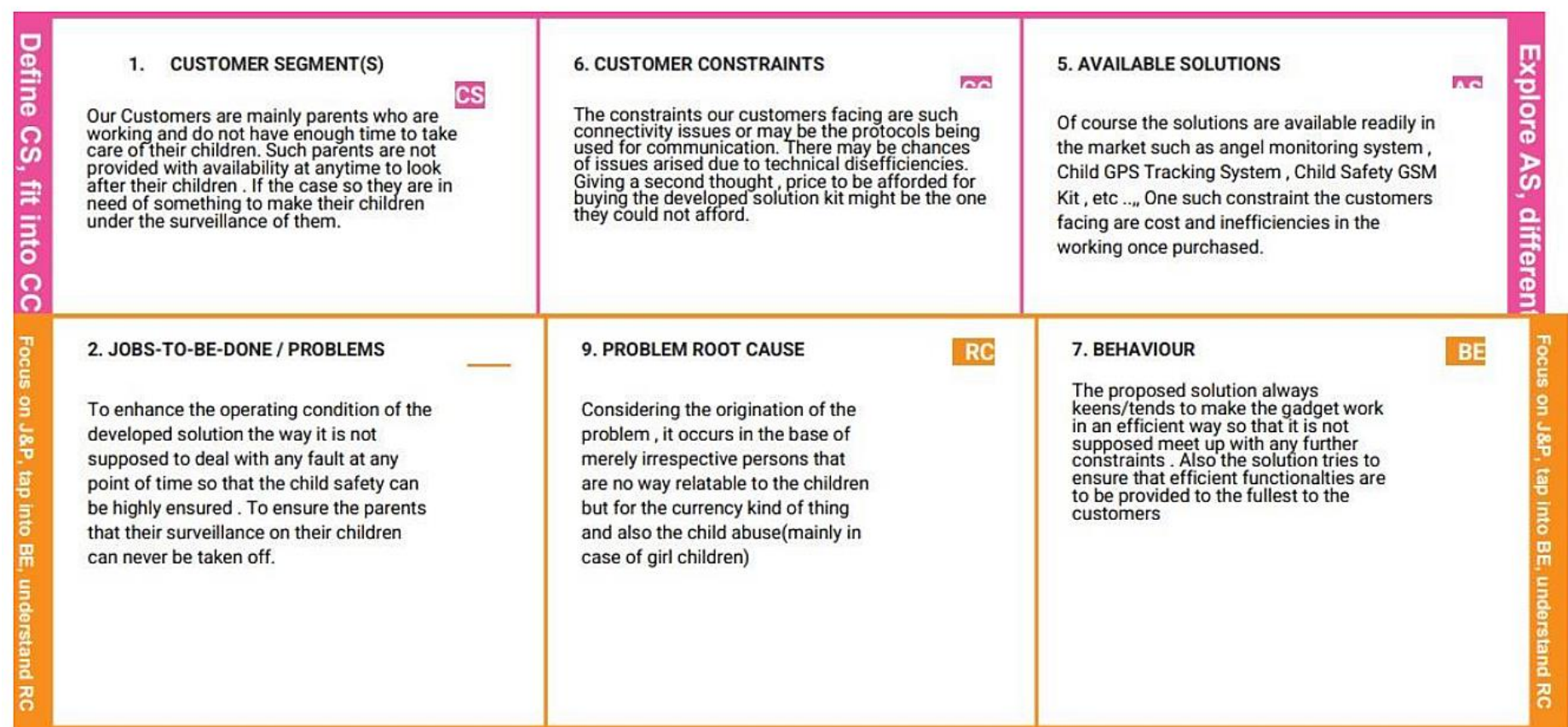
Top 3:

- Creation of mobile application
- Geofencing child's movements through APIs
- Integration with Cloud services

3.3 Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Children are facing a lot of crimes nowadays whether in society or on any social media platform.
2.	Idea / Solution description	The idea is to develop an IOT-based safety gadget to monitor children and ensure their safety.
3.	Novelty / Uniqueness	To create a device that is easily carriable, wearable, comfortable, and safe for children to use.
4.	Social Impact / Customer Satisfaction	The user will be able to track their children throughout the day. if any emergency will be intimated aboutit. The user will get the exact information about their child.
5.	Business Model (Revenue Model)	Portable, comfortable and small in size. To ensure that the device is safe for children to use.
6.	Scalability of the Solution	Reliable and cost-effective.

3.4 Problem solution fit



4.REQUIREMENT ANALYSIS

4.1 Functional Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story/ Sub-Task)
FR-1	User Registration	Registration throughForm Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	Authentication	Only the authorized personfor that product willknow Ensuressecurity
FR-4	User Interface	The Inventor Able to see the location of children when they are out of geofence will also track the exact information about the children
FR-5	Notification	Notified through mobile and mail

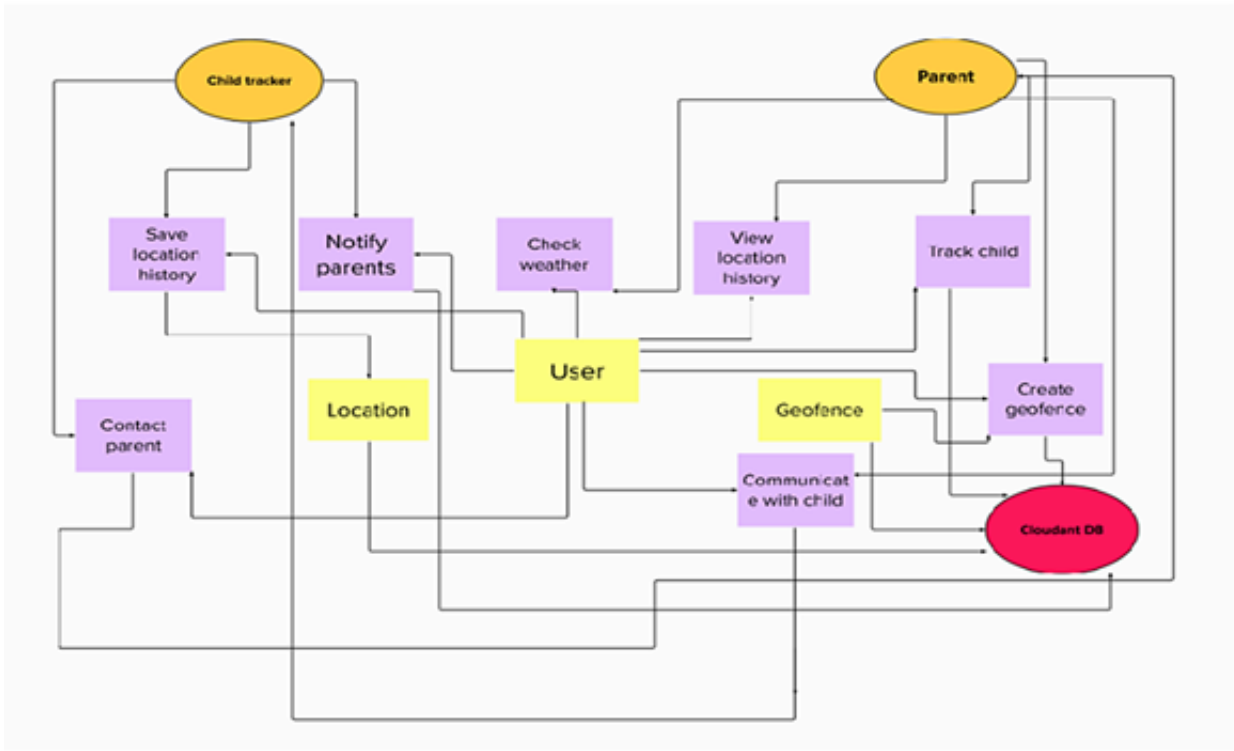
4.1 Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Accessed through Mobile App Showing location (latitude and longitude) of child and also other measures to ensure safetylike notification. Portable

		and comfortable to use.
NFR-2	Security	Database security and ensuring the safety of the product while in use.
NFR-3	Reliability	Once logged in, the webpage is available until logging out of the app, and a comfortable platform or creates a good environment for users to use.
NFR-4	Performance	Each page must load within 4 seconds and database needs to be updated every few seconds and a notification must be sent immediately if seen a change in the child's location.
NFR-5	Availability	The data must be available whenever needed and the product should be able to use at any time.
NFR-6	Scalability	The process must be flexible to use at any time and versatile.

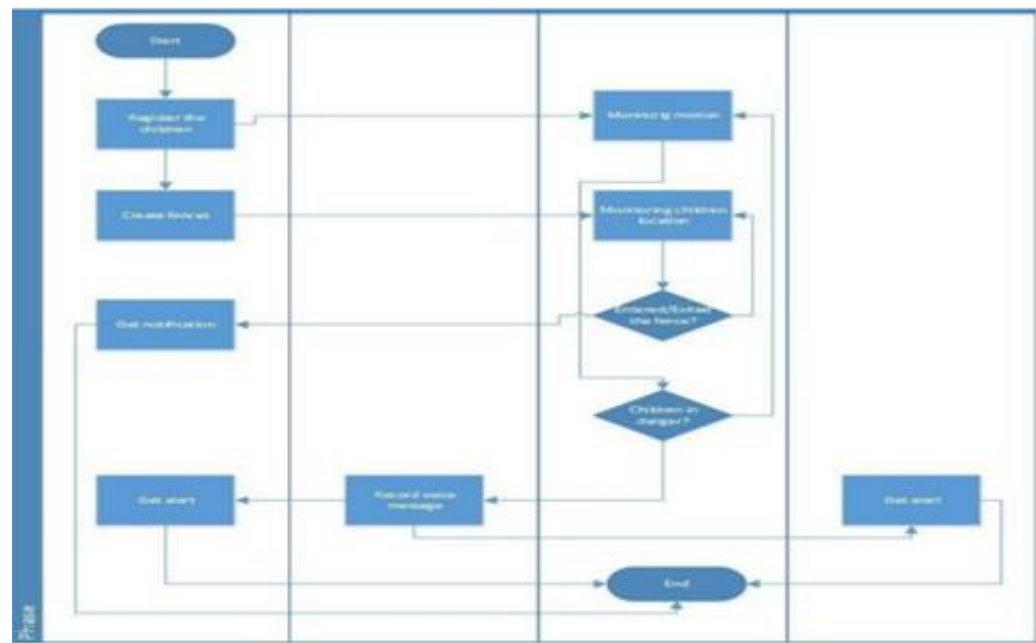
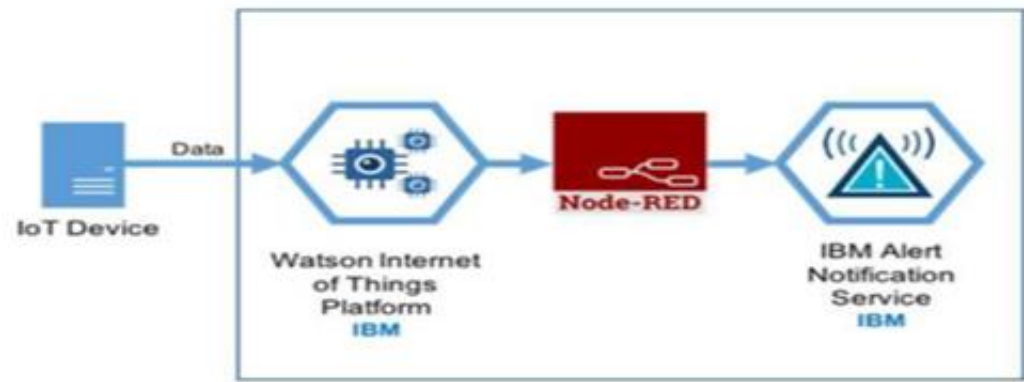
5. Project Design

5.1 Dataflow Diagram

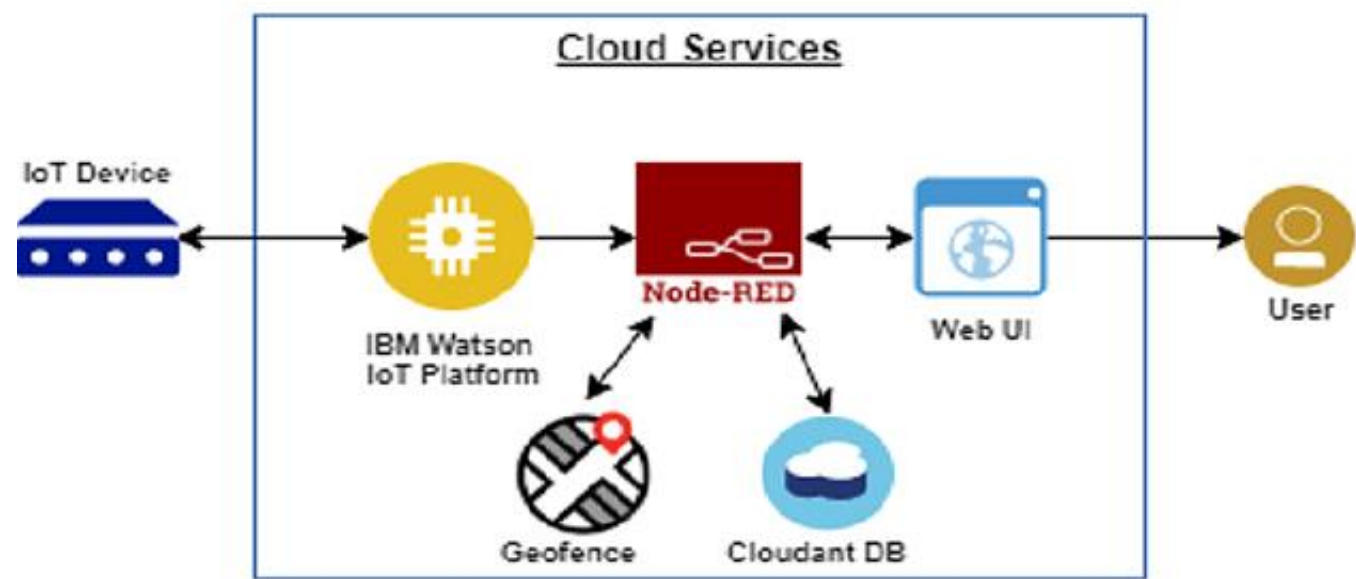


5.2 Solution and TechnicalArchitecture

Solution Architecture



Technical Architecture



5.3 User Story

User	Functional Requirement (Epic)	User Story Number	User Story/Task	Acceptance criteria	Priority	Release
Customer	Uploading the real time data.	USN-1	The user will be presented with two options. 1. Speech to sign language conversion. 2. Sign language to speech conversion.	They can access the portal	High	Sprint -1
		USN-2	Language selection	They can access the portal	Low	Sprint -1
		USN-3	The deaf-mute person will choose the speech to sign language conversion which would take them into a portal that collects the real time data (sign language recognition) and converts it into speech simultaneously.	Video processing	High	Sprint -2
		USN-4	Emotion detection	Video processing	Medium	Sprint -1

		USN-5	Normal person would choose speech to sign language which would take them into a portal where their speech is converted into sign language simultaneously.	Video and audio processing	High	Sprint-1
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6. Project Planning and Scheduling

6.1 Sprint Planning and 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 by entering my email, and password, and confirming my password.	4	High	DIVYA
Sprint-1	Confirmation Email	USN-2	As a user, I will receive a confirmation email once I have registered for the application	4	High	PRIYANKA
Sprint-1	Authentication	USN-3	As a user, I can register for the application through Gmail and mobile app.	4	Medium	ANANTHI
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password	4	High	ANANTHI
Sprint-1	Dashboard	USN-5	As a user, I need to be able to view the functions that I can perform	4	High	LAVANYA
Sprint-2	Notification	USN-1	As a user, I should be able to notify my parent and guardian in emergency situations	10	High	DIVYA
Sprint-2	Store data	USN-2	As a user, I need to continuously store my location data into the database.	10	Medium	PRIYANKA
Sprint-3	Communication	USN-3,1	I should be able to communicate with my parents	6	Low	DIVYA, ANANTHI

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	IoT Device – Watson communication	USN-1,4	The data from IoT device should reach IBM Cloud	7	Medium	DIVYA, ANANTHI
Sprint-3	Node RED- CloudantDB communication	USN-5,2	The data stored in IBM Cloud should be properly integrated with Cloudant DB	7	High	LAVANYA, PRIYANKA
Sprint-4	User – WebUI interface	USN-1,4	The Web UI should get inputs from the user	6	High	DIVYA, ANANTHI
Sprint-4	Geofencing	USN-2,3,5	The geofencing of the child should be done based on the geographical coordinates	7	High	PRIYANKA, ANANTHI, LAVANYA

6.2 Sprint DeliverySchedule

Project Tracker, Velocity & Burndown Chart: (4 Marks)

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	18 Oct 2022	23 Oct 2022	20	29 Oct 2022
Sprint-2	20	6 Days	24 Oct 2022	29 Nov 2022	20	05 Nov 2022
Sprint-3	20	6 Days	31 Nov 2022	05 Nov 2022	20	12 Nov 2022
Sprint-4	20	6 Days	07 Nov 2022	12 Nov 2022	20	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 per day)

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

Transaction History - GetIt! x https://www.fast2sms.com x IBM x IBM-51319-1662683870 x Resource list - IBM Cloud x IBM Watson IoT Platform x

ewflow.internetofthings.ibmcloud.com/dashboard/devices/browse

Gmail YouTube News Translate IBM profile courses.ictacademy... Sign up for IBM Clo... SmartLancer WhatsApp fiverr Dashboard Sign-In | test ID IBM live typy Yaakobu (YaakobuS...

IBM Watson IoT Platform 512419104007@smartintemz.com ID: ewflow

Browse Action Device Types Interfaces Add Device +

Browse Devices

All Devices Diagnose

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

Search by Device ID Device Simulator

Device ID	Status	Device Type	Class ID	Date Added	Descriptive Location
stephin2001id	Disconnected	first2001devicetype	Device	16 Oct 2022 14:23	

Identity Device Information Recent Events State Logs

Device ID stephin2001id

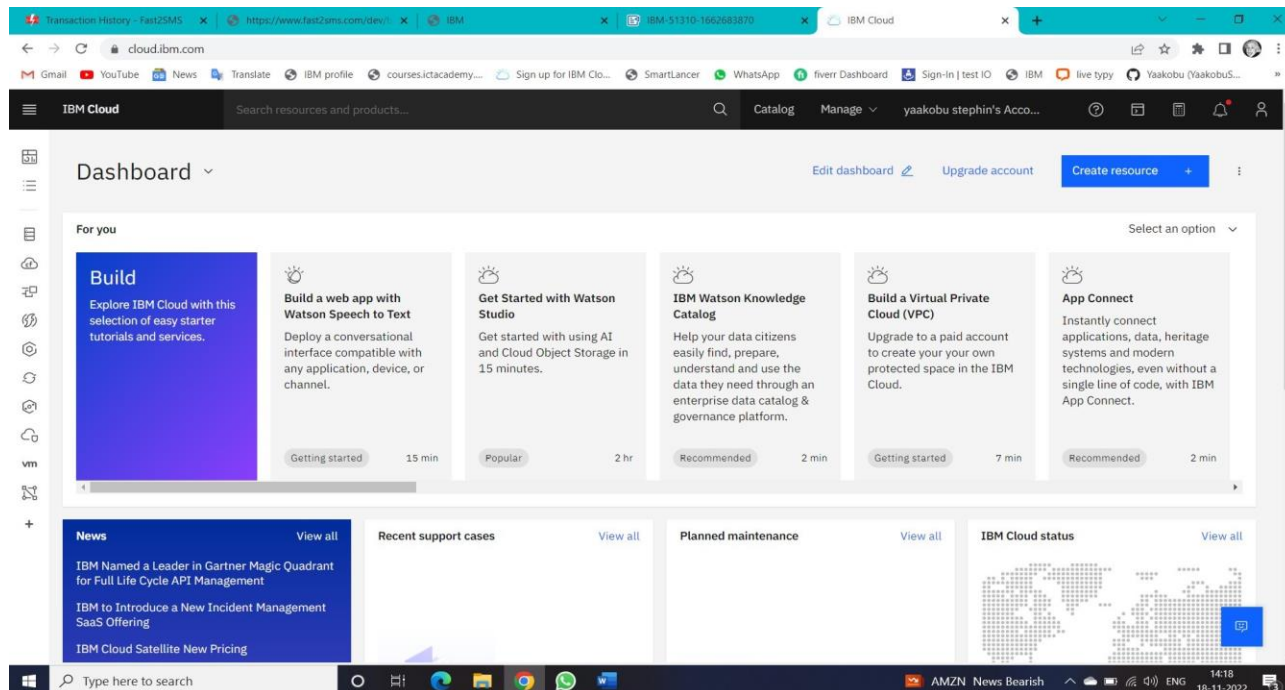
Device Type first2001devicetype

Date Added 16 Oct 2022 14:23

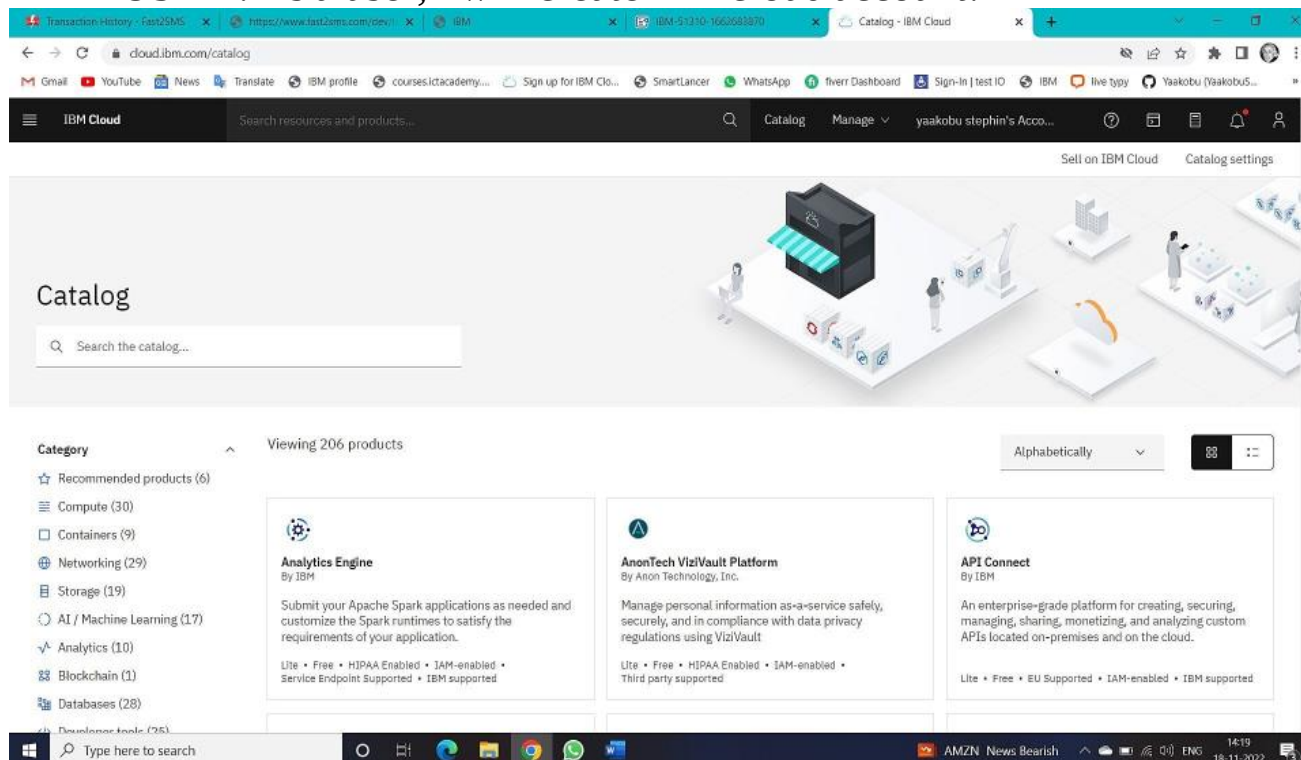
Type here to search 29°C Mostly sunny 14:21 18-11-2022

7. CODING & SOLUTIONING (Explain the features added in the project along with code)CREATE AND CONFIGURE IBM CLOUD SERVICES:

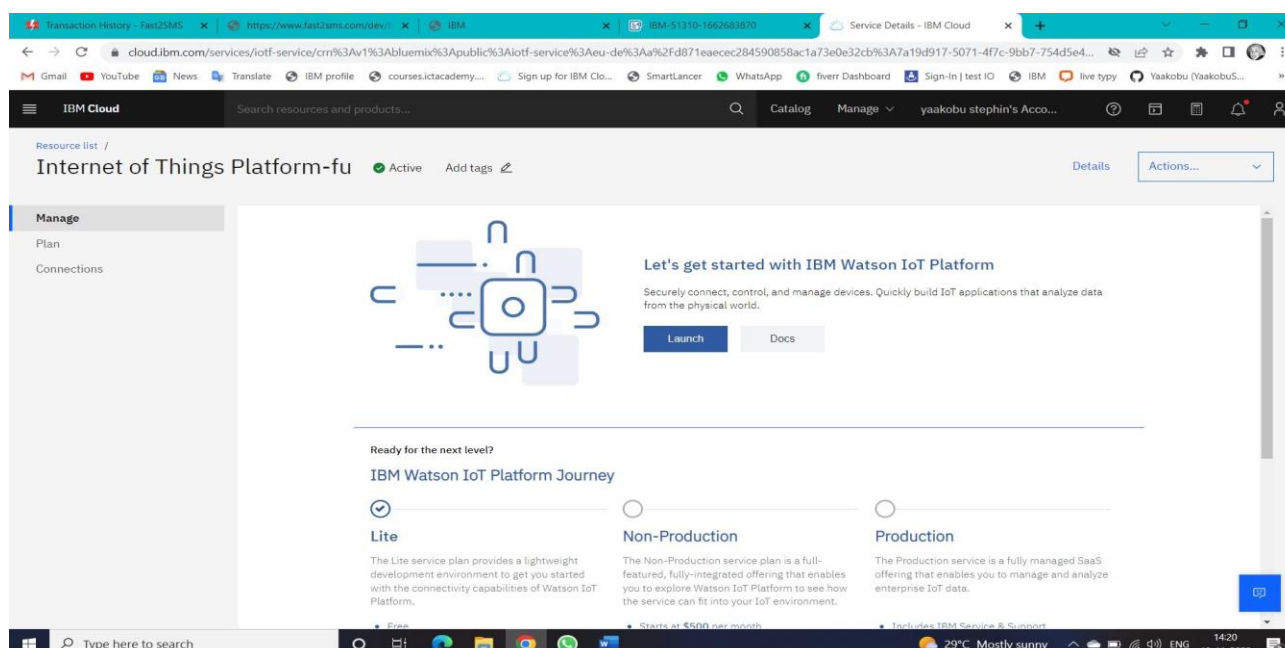
USN 1: As a user I need to enroll the cloud registration :



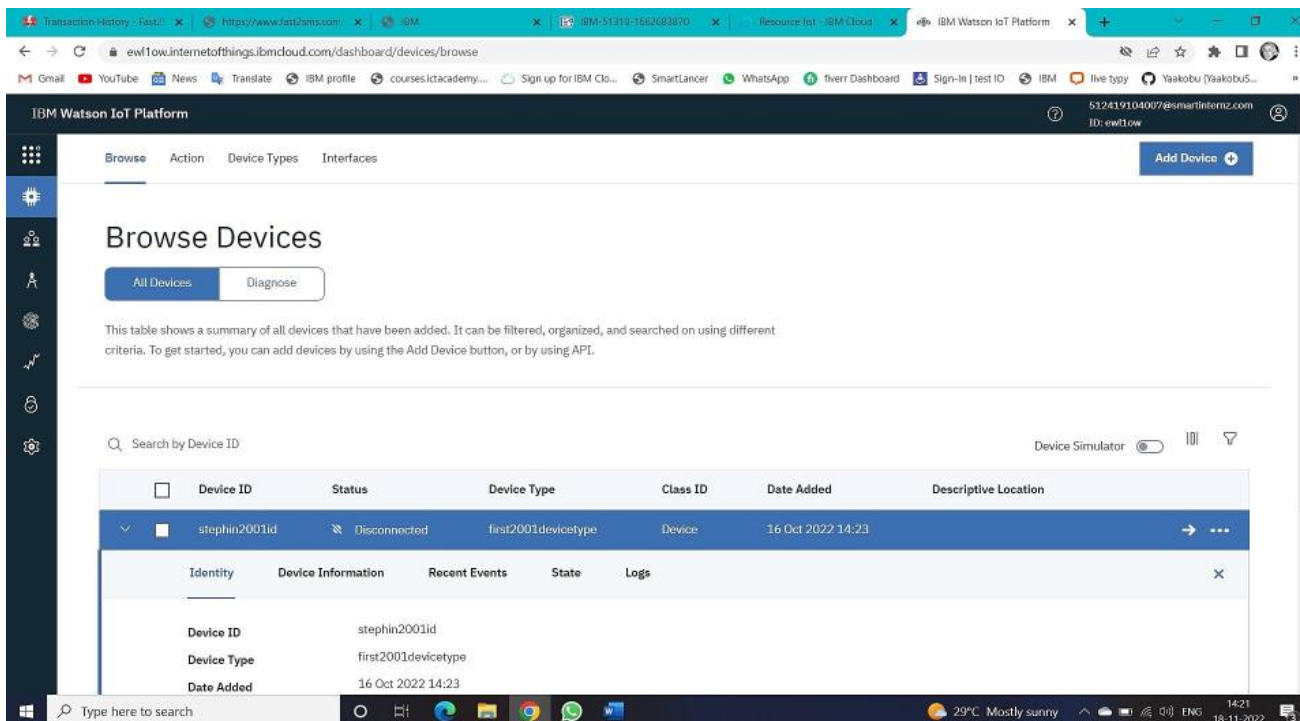
USN 2: As a user, I will create IBM cloud account:



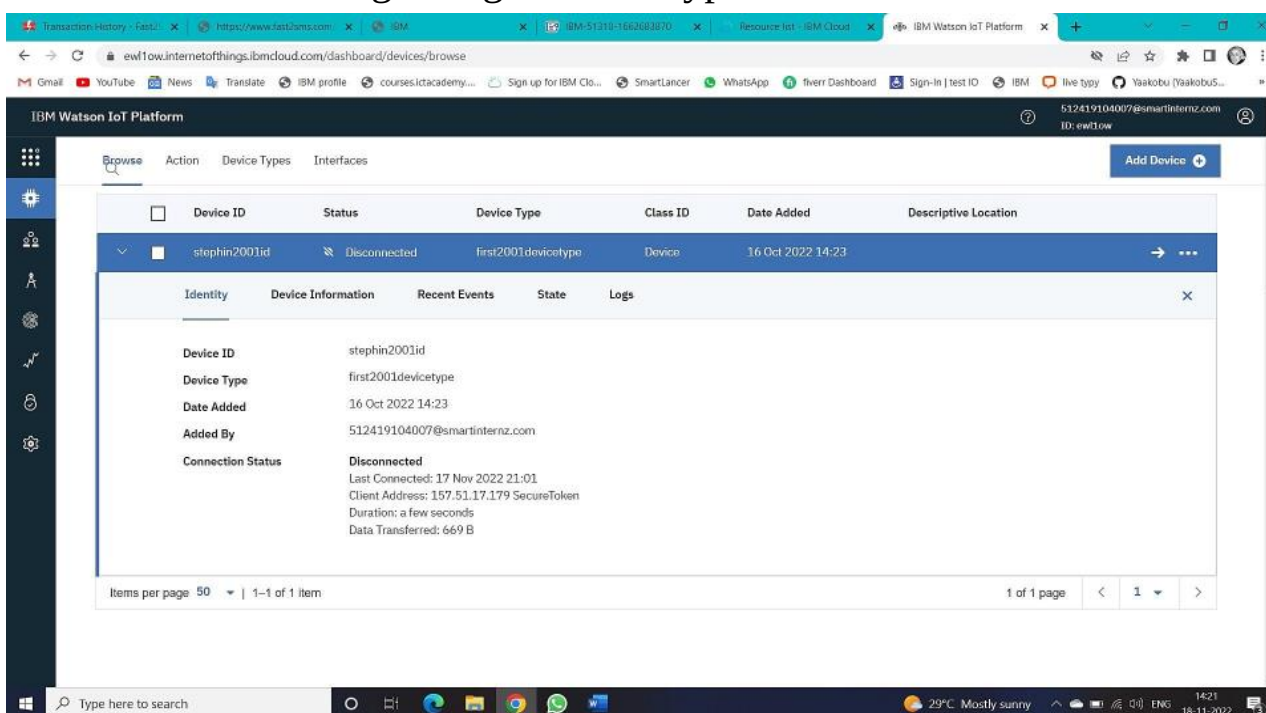
USN 3: After creating cloud account launch IBM Watson IOT platform by accessing cloud account:



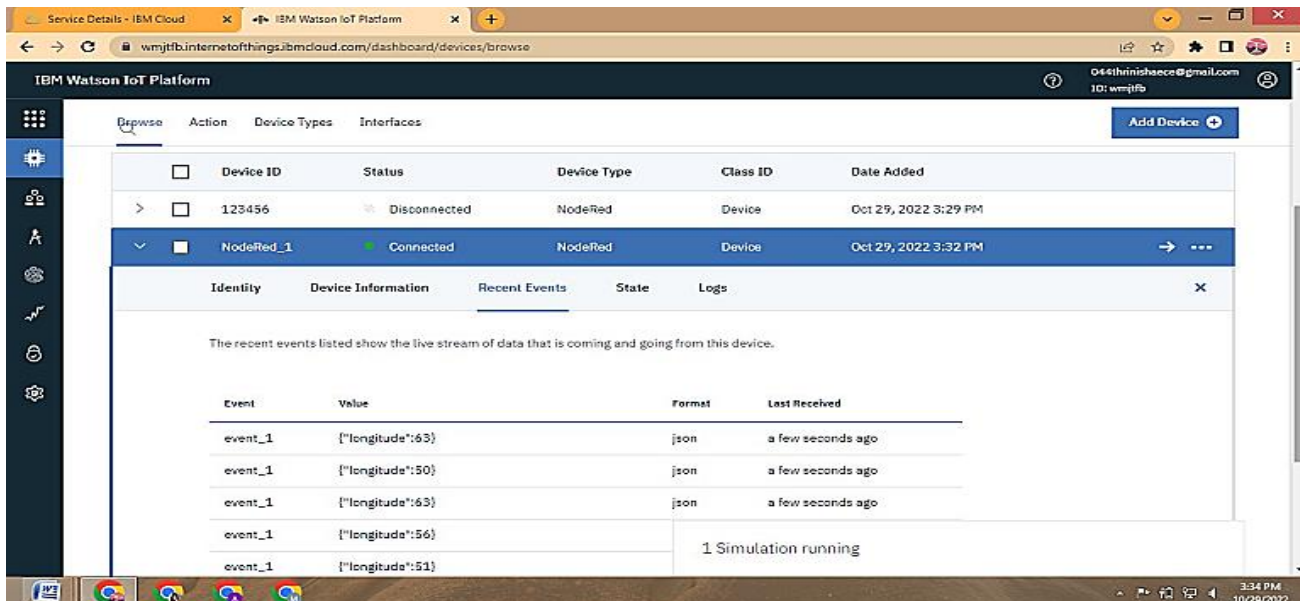
USN 4: Create the node in IBM Watson platform :



USN 5: After Creating node get deviceType and ID :

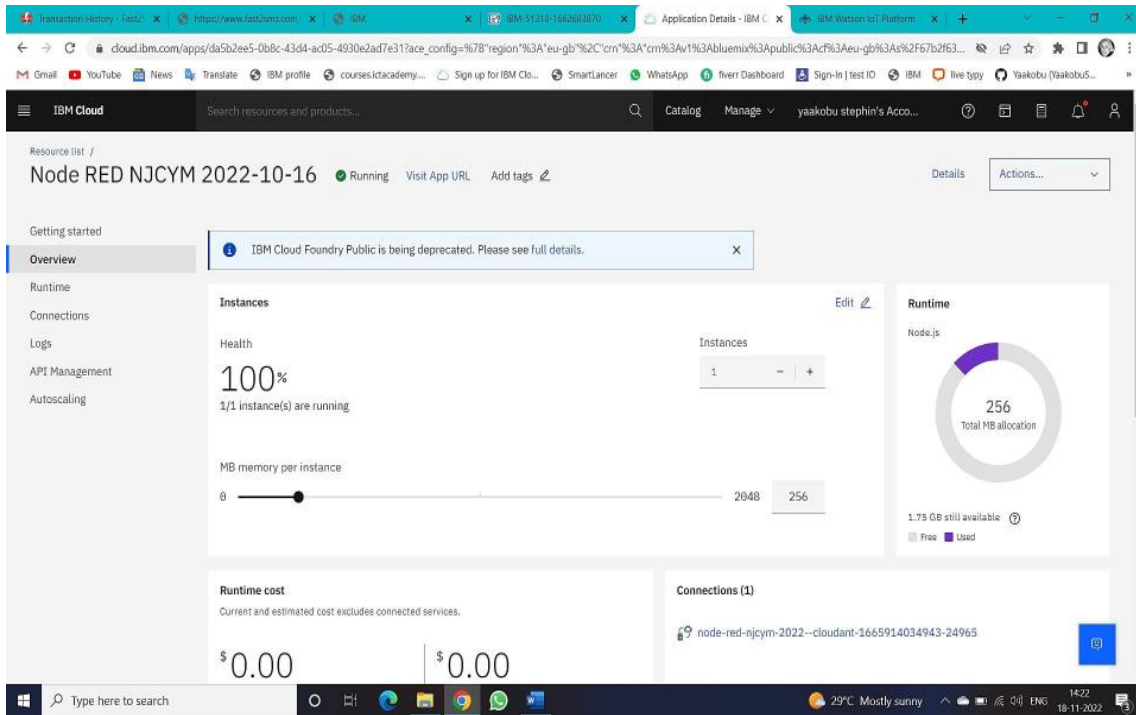


USN 6: Simulate the node created:

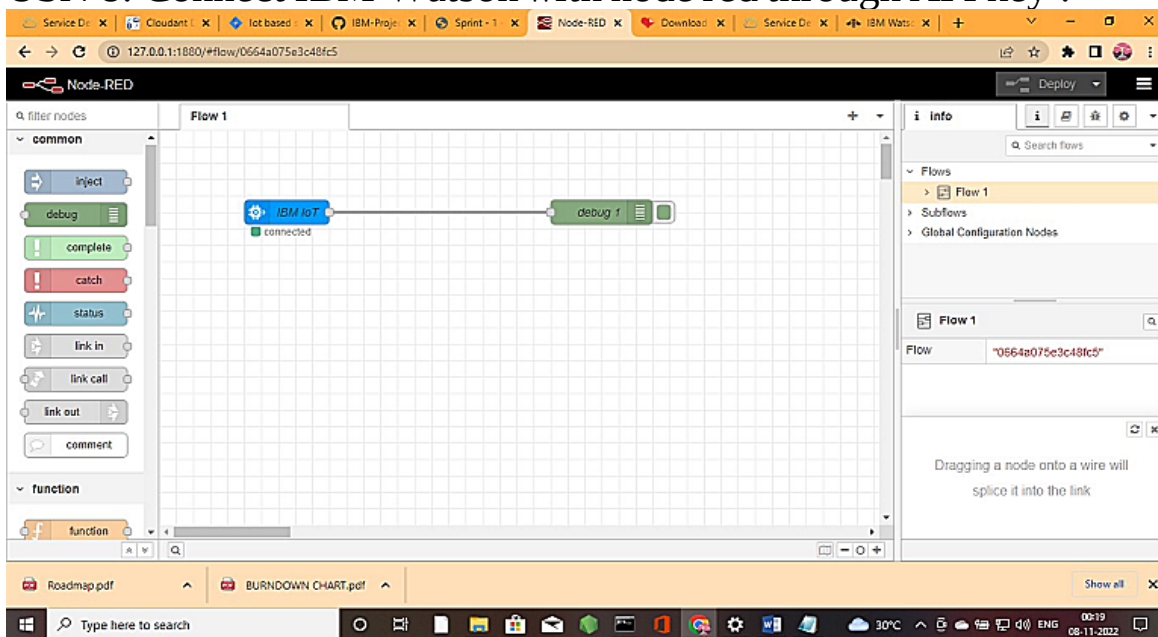


7.1.CREATE AND ACCESS NODE-RED :

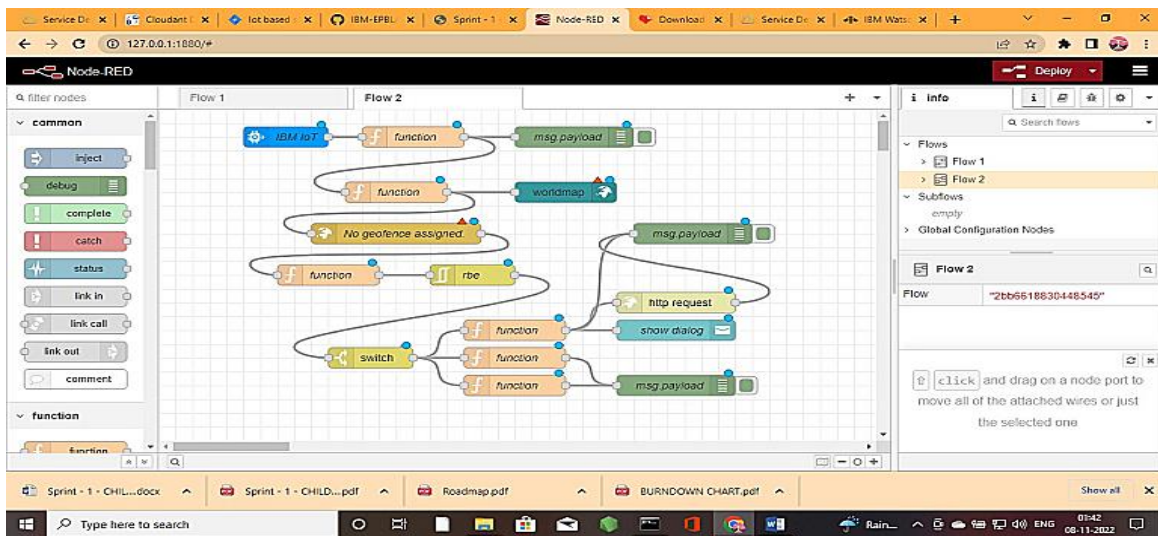
USN 7: As a user, I can create Node-red by app deployment :



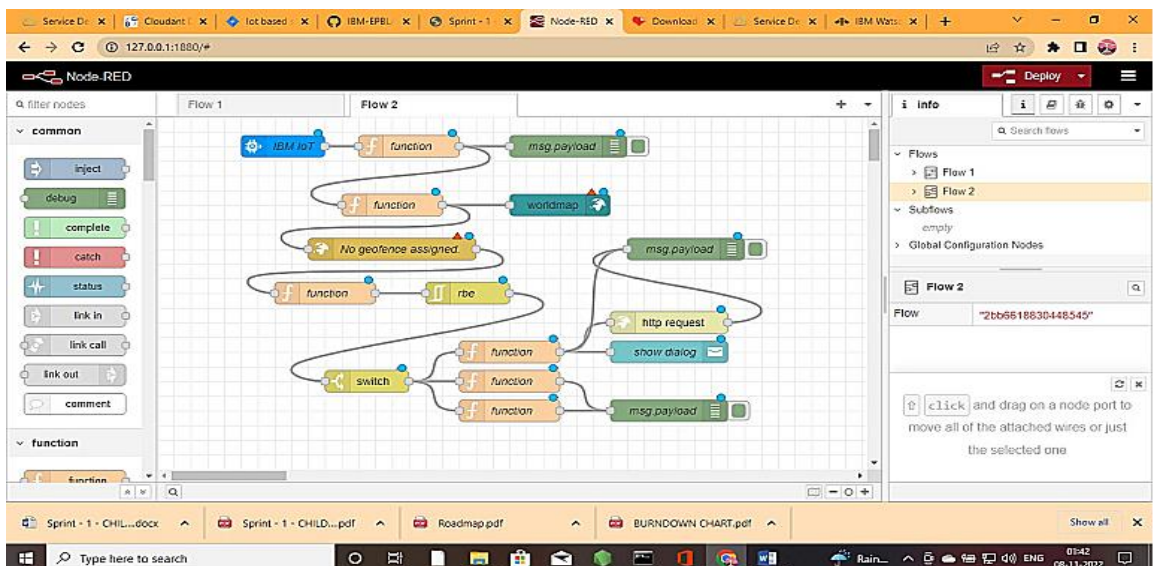
USN 8: Connect IBM Watson with node red through API key :



USN 9 : Design the project flow using Node-Red :

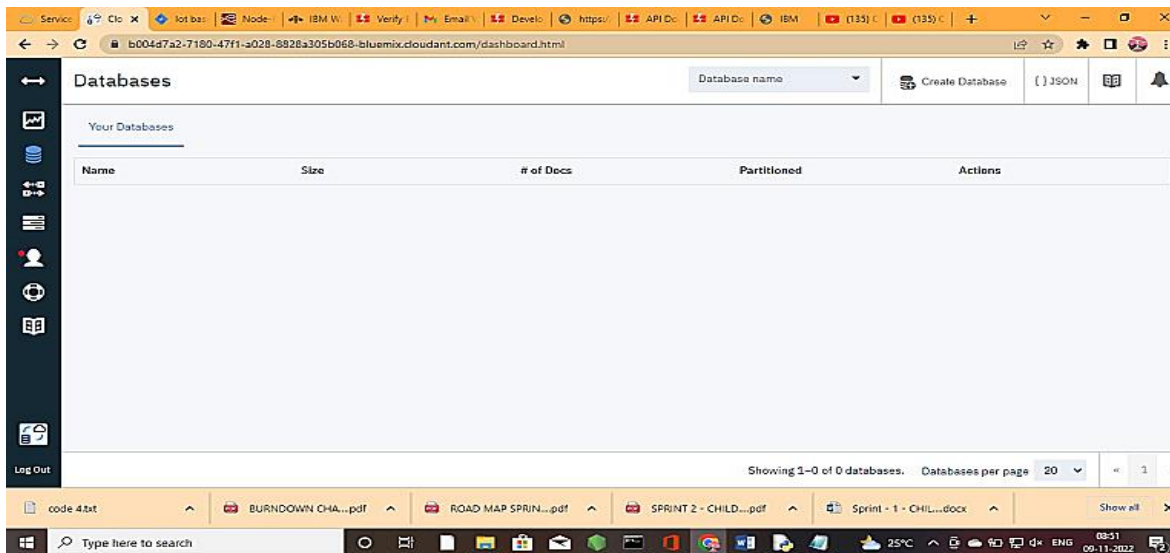


USN 10: Check for the proper connections and the output in the node red application :

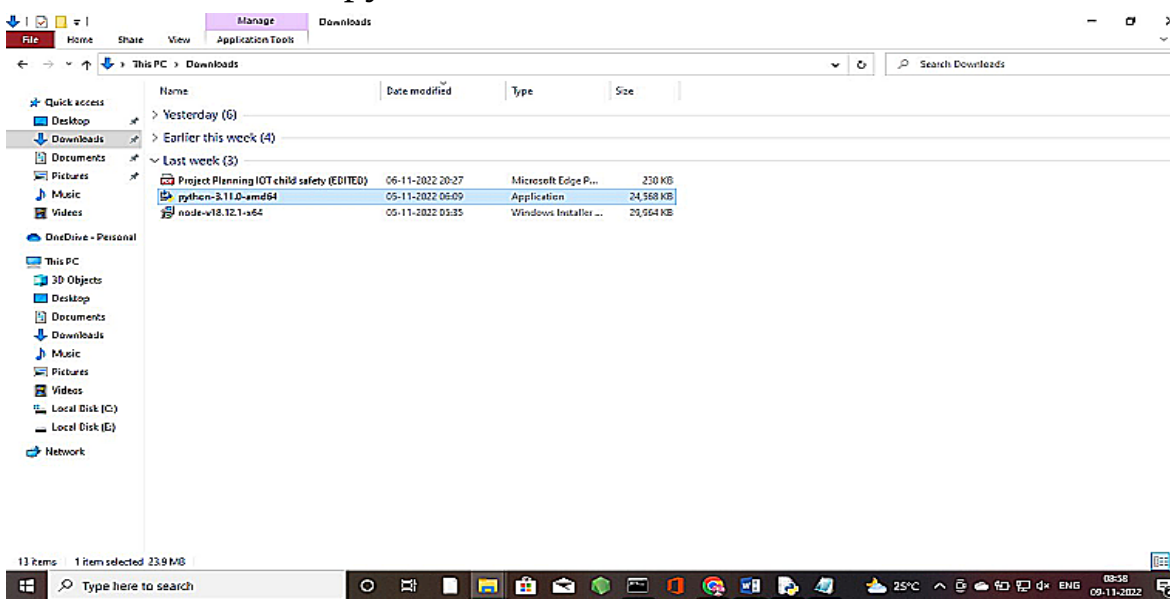


7.2.CREATE A DATABASEIN CLOUDANT DB AND DEVELOPTHE PYTHONSCRIPT :

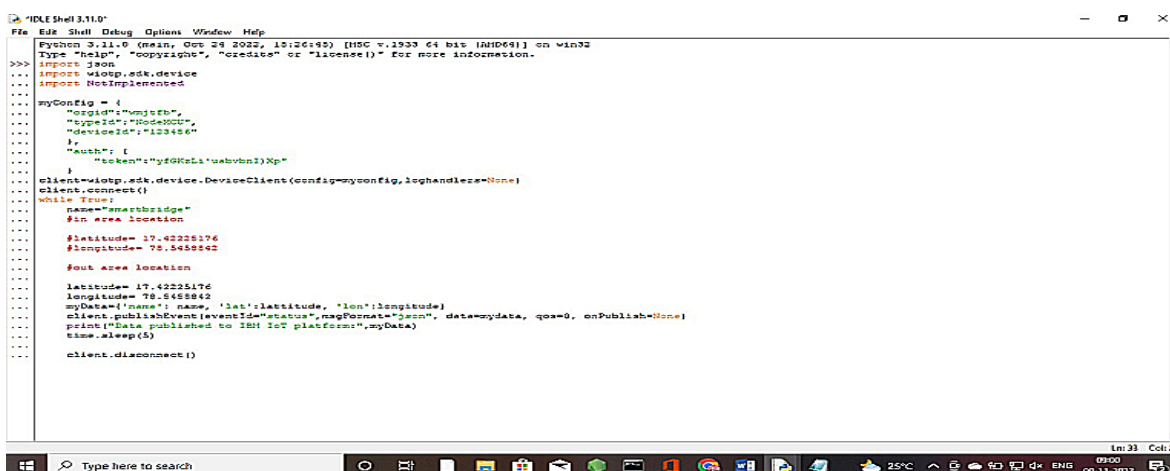
USN 11: Launch the Cloudbant DB and Create database to store the location data :



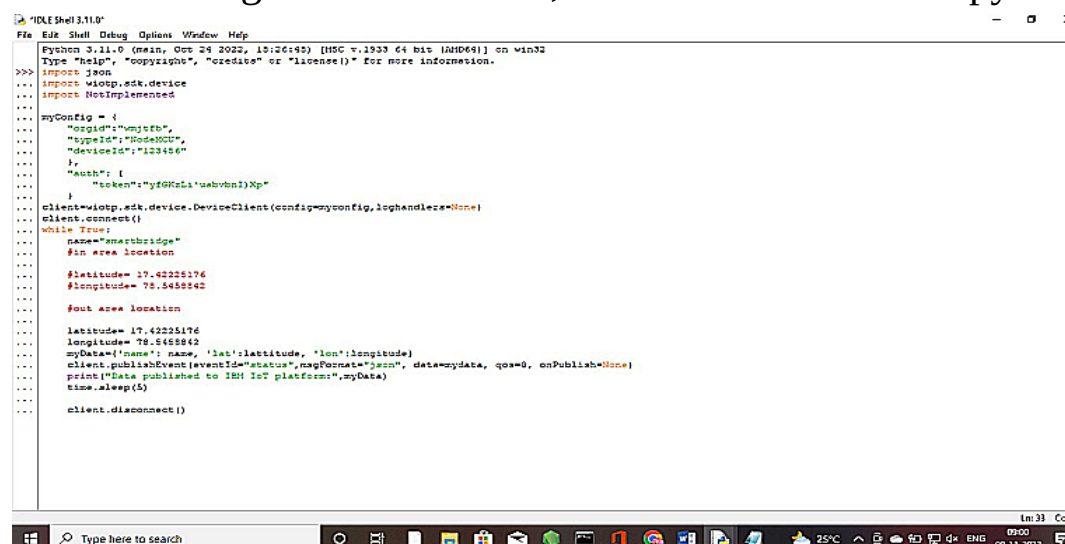
USN 12: Install the python software:



USN 13: Develop the python scriptsto publish detailsto IBM IoT Platform:



USN 14: Integrate the device id, authentication token in pythonscript :



USN 15: Developthe python code for publishing the location (latitude&longitude) toIBM IoT Platform :

```
"IDE Shell 3.11.0"
Python 3.11.0 (main, Oct 24 2022, 10:26:45) [MSC v.1933 64 bit (AMD64)] on win32
Type "help", "copyright", "credits" or "license()" for more information.
>>> import json
... import wiop.msk.device
... import NotImplemented
...
... myConfig = {
...     "orgId": "myorg",
...     "typeId": "NodeMCU",
...     "deviceId": "123456"
... }
...
... "auth": {
...     "token": "eyJ0eXkiOiJ1b3Vhbn1Xp"
... }
... client=wiop.msk.device.DeviceClient(config=myConfig, logHandler=None)
... client.connect()
... while True:
...     name="SmartBridge"
...     #in area location
...     #latitude= 17.42225176
...     #longitude= 78.5455842
...     #out area location
...     latitude= 17.42225176
...     longitude= 78.5455842
...     myData={'name': name, 'lat':latitude, 'lon':longitude}
...     client.publish(eventId="status", msgFormat="json", data=myData, qos=0, onPublish=None)
...     print("Data published to IHI IoT platform",myData)
...     time.sleep(5)
...
... client.disconnect()
```

8. Testing

a. Test Cases

- i. Verify if user can see the options when user clicks the URL
- ii. Verify if the UI elements are getting displayed properly
- iii. Verify if the user can choose any languages
- iv. Verify if the user is getting redirected to the sign to speech page
- v. Verify if the application can convert the sign to speech
- vi. Verify if the user can exit the sign to speech page
- vii. Verify if the user is getting redirected to the speech to sign page
- viii. Verify if the UI elements are being displayed
- ix. Verify if the application can convert speech to text on clicking voice to text button.
- x. Verify if the user can exit the speech to sign page.

b. UAT Testing

Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	11	7	4	2	24
Duplicate	1	0	2	0	3
External	2	3	2	1	8
Fixed	10	5	3	14	32
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	1	0	0	0	1
Totals	25	15	13	18	71

9.RESULTS

9.1.PERFORMANCE METRICS

One of the module in our project is temperature sensor which is used to detect the temperature of the child as well as the surrounding temperature. If there occurs any abnormal rise or fall in temperature in the body of the child or in the surrounding it will notify the user as per the coded time delay as shown in the picture. It will show the temperature and humidity values notifies the user based on the predefined value abnormal fall or rise scenarios.

We also have a web camera through which we can monitor the child lively through live video streaming whenever we get notified in abnormal cases. We have an IP address for the camera fitted with the kit and we are supposed to enter that IP address in our mobile application or web application through which we can see the live video streaming of what's happening around the child as shown in the picture. we can monitor the child 24/7 in real time through the help of this live streaming which makes parents feel that they are beside their children ensuring children's safety

10.ADVANTAGES AND DISADVANTAGES

ADVANTAGES:

- Technological Gadgets Promote Independent Learning.
- Enhances Communication.
- Gadgets can Speed Up Work.
- Teachers Can Educate Students in an Exciting Way.
- Boosts Collaboration

DISADVANTAGES:

- attention deficit
- cognitive delays
- impaired learning
- increased impulsivity
- decreased ability to self-regulation

11.CONCLUSION

The word Future resembles the word Children. As Dr. A.P.J Abdul Kalam's words "Youngsters are the future pillars of one's nation", today's children are tomorrow's youngsters, preserving their dreams and life for a better future is necessary. Therefore, each and every parent should take care of their own children, without letting them to fall into the dark world of abuse, which entirely ruin them physically, mentally and emotionally destroying our future. Hence, considering the importance of our future, our project makes it easy for parents to track their children and to visually monitor them on regular basis, which makes them ensure the safety of their children and reduces the rate of incidents of child abuse.

12.FUTURE SCOPE

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

13.APPENDIX

GitHub & Project Demo Link

<https://github.com/IBM-EPBL/IBM-Project-14732-1659589239>