PROJECT REPORT

TEAM ID	PNT2022TMID03213
PROJECT TITLE	IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION
TEAM MEMBERS	UDHAYANAN C, TRISHA S, UMA M, VALARMATHI E, SINDHU PRIYA M

ABSTRACT

The overall percentage of child abusements 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 abusements, 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 condition 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 makes 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.

1 INTRODUCTION

a) Project Overview

Internet of Things (IoT) is a set of systems and devices interconnected with real-world sensors and actuators to the Internet . It is able to make decisions via detecting the surrounding environment without human interaction . In this research, IoT is applied to propose a wearable smart band which helps parents to monitor and get known of their child's condition at anywhere and anytime even if they are not by their children side. Via the IoT smart band, children safety is guaranteed, and crime rate is reduced as immediate actions can be taken in case the child is in danger. Besides, unlike existing smart band, which is less focusing on child security aspect, the proposed system emphasizes in getting as much data as possible so that actual situation can be identified. The use of IoT in this device is motivated by the need of child security system in Malaysia due to child safety issues resulting from increasing cases on child related crime. In fact, 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 in Malaysia. Actually, there is a need to use IoT-based child security system since the safety of children has become a major concern . In fact, crimes on children keep increasing despite actions have been taken by the government. the overall percentage of child abasements worldwide is about 80% nowadays, out of which 74% are girls and the remaining are boys. For every 40 seconds, a child is gone missing in the world. Due to that, parents are worried for their children and

perhaps, a hard challenge for them to guarantee safety of their children when they are out.

b) Objective

- Enable tracking of the child's location and capturing of data remotely such as temperature, pulse, respiratory rate, quality of sleep and many more.
- To show the child's actual data with reference values.
- Enable sending of notification if the child is out of location or when the device realizes abnormal conditions/situations.
- To trigger the alarm and enable automatic video recording whenever the emergency button is pressed. Then, emergency notification along with real-time video will be sent to and display in the parents' mobile apps.
- Develop a prototype of IoT wearable smart band monitor the actual condition of children at anytime and anyplace.

2 RELATED WORK

2.1 EXISTING WORK

In today's world children are less secure and have many issues concerning their security purpose. More family's spent their time for work and social accountability but since Children are gifts of GOD they need the care of family. The current status of our country is not habitable for monitoring children in school. With the absence of a child monitoring system, it is hard to monitor the whereabouts of children. Underage children may be impulsive in the way they act and in places to be. Most of the human behavior is shaped in the childhood stage, in order to get morally acceptable behaviour child monitoring system is necessary. Children are prone to many accidents. The safety of children is very indispensable as children

cannot protect themselves. Child abductors continually abduct children from parents/legally appointed guardians to get the ransom for their benefit. Parents have no supplementary choice but to view the exact scenario of children's intuitions. The crisis out-turn of kidnapping can be highly cynical and perpetual, more measures must be taken to protect children against abduction and its impacts.

2.2 REFERENCES

- **Title: Smart and Secure IoT based Child Behavior and Health Monitoring System**

  Proposed work: It enables the child to get involved with some android games which will make them to think and act dynamically. The game scores and the sensor readings obtained will be monitored and analyzed by the system and the actions will be taken accordingly. Tools used/ Algorithm: Hadoop, C4.5 algorithm.

- **Title: Intelligent Child Safety System using Machine Learning in IoT Devices**

  Proposed work: It is a wearable device which is designed to continuously monitor the location and body vitals of the children. It is to aid parents to monitor and track their children in real time as an alternate to stay beside them. Tools used/ Algorithm: Machine Learning, Decision Tree Classifier, Autonomous Decision.

- **Title: IoT Based Smart Band for Tracking Position and Monitoring Conditions of Children**.

  Proposed work: It enables the parents to monitor their children along with the mobile application as a display the information about the children and their

situation by collecting data from the database transmitted by the device. It captures children's heartbeat and device's location data. Tools used/ Algorithm: Bluetooth, GPS.

- **Title: IoT Based Localization and Tracking**

  Proposed work: It provides current state of the art for IoT based localization and tracking and also shows key technical aspects, compare the IoT based initiatives for localization and finally show the utilities in different application domains Tools used/ Algorithm: RFID technology, Bluetooth.

3 IDEATION AND PROPOSED SOLUTION

3.1 Empathy Map Canvas

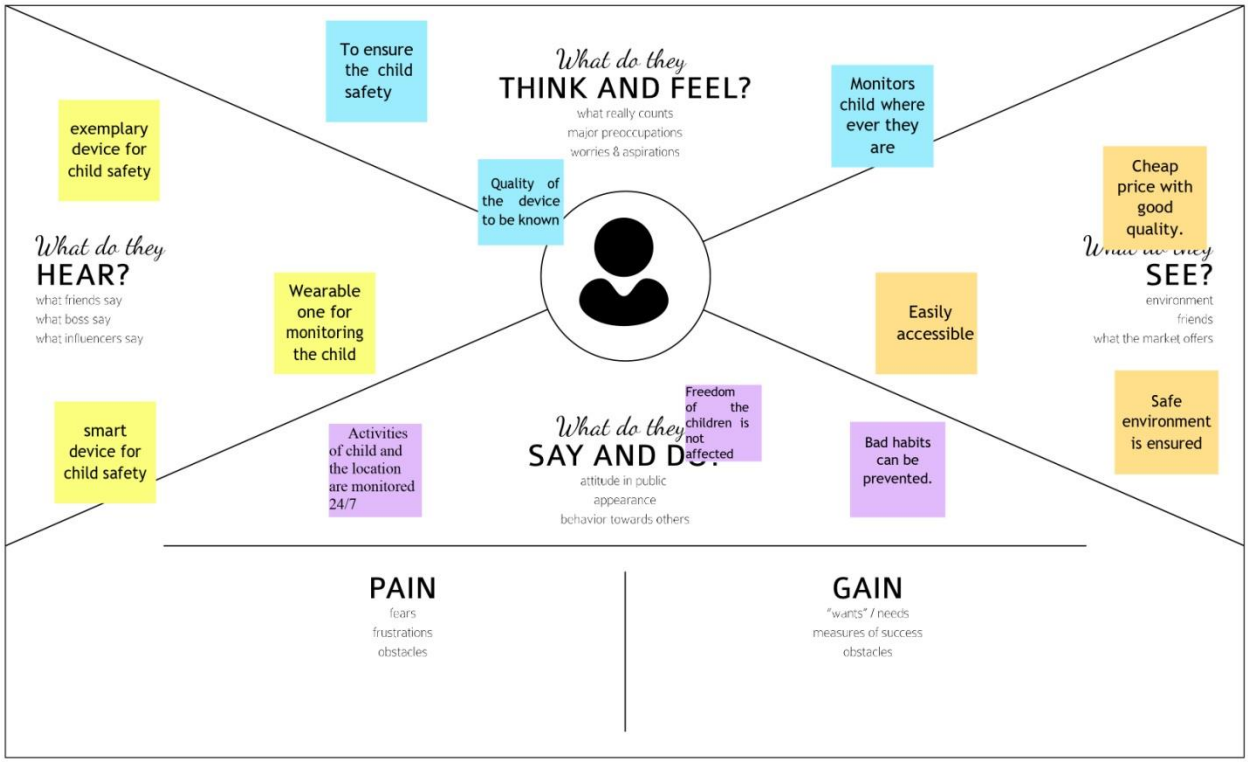


Fig 1 Empathy map

3.2 Proposed solution

If the device moves, out of that boundary the server transfers an alert call by activating the GSM, to the user. The live location of the device will be updated in the server and pinged in the website for every few seconds. The server side coding was written in PHP and the controller side coding was written in Python. The user will receive an alert call and after entering the login ID and password, they can check the live location through GPS, which was updated in the application. When giving boundary for the school unit, we can also maintain attendance by updating the entry and exit of the child, in and out, of school in the application. We feed specific threshold values for sensors like temperature and pulse in which, if the device exceeds those threshold values or if the device gets exposed to abnormal condition then those values tend to be updated in the server. The server compares the currently obtained values with the coded threshold values, if they are beyond the threshold value, it generates an alert message through GSM. The alert messages are delivered to specified users in the form of SMS and the user can be able to login to the application to check the status and updated information. After receiving the alert messages, if the user wants to visually check the status of the child, they are required to enter specific IP address of that camera for the first time before syncing and can be able to watch the live streaming videos which are updated to the server, for further uses they can directly view. The microprocessor is used to control all these actions and the alert was done by checking for specific user of that device in the database.

S.NO	PARAMETER	DESCRIPTION
1	Problem Statement (Problem to be solved)	Child abductors continually abduct children from parents/legally appointed

		guardians to get the ransom for their benefit. Parents have no supplementary choice but to view the exact scenario of children's intuitions. The crisis out-turn of kidnapping can be highly cynical and perpetual, more measures must be taken to protect children against abduction and its impacts.
2	Idea / Solution description	A Smart IoT device for tracking is developed to aid parents to detect and keep 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 set the seal on their safety. The application aside from conceding you to track down your children when they're within Bluetooth range, also functions when your kids go farther afield. Its competence as a tracker is outstanding if you live in. Densely populated areas like cities or big towns. This means you will be able to see the identity of the participating devices and It helps to diminish their vulnerability in harmful situations and also protects the

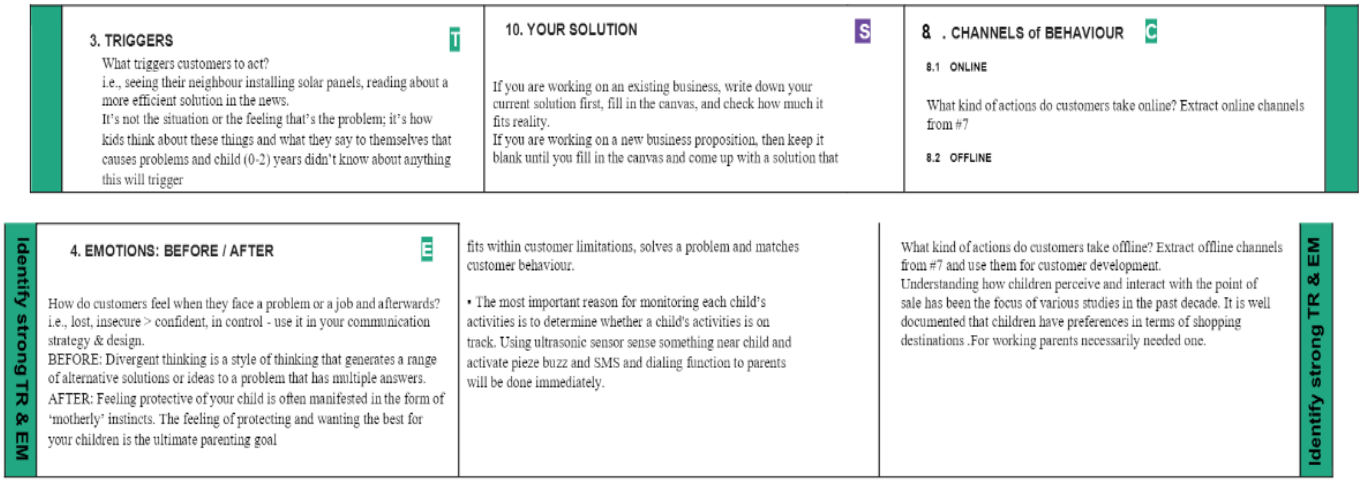
		children in emergency situations.
3	Novelty / Uniqueness	The system software involuntarily alerts the parent/guardian by redirecting a text message where expeditious scrutinisation is essential for the child during a catastrophe. Contrary to other devices, it has plenty of characteristics such as the development of sensors technology, availability of internet-connected devices; data analysis algorithms making IoT devices act smart in emergencies without human intervention.
4	Social Impact /Customer Satisfaction	Child abduction is a scorching subject all over the world. It is a complex crime that can impair a child's future. Parents should ensure that their little ones are secure and are been protected from the menace of injury. In case of situation arises, notifications will be consigned to the Parents so that measures can be done at the apparent time, Via this, Child Safety can be assured and will take the edge off the crime rate. The parent can keep their children Secure with tension-free minded when they are away from them.

		Precisely predicting the circumstances of the children and swiftly sensing the problems around children will make parents at ease. It will be great helpful to parents who are busy workers not having time to watch over their children, and easy to operate so anyone can handle
5	Business Model (Revenue Model)	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 so it is a Foundation for a prominent revolution in merchandise. It is a device with numerous subscriptions for tracing and notification assistance.
6	Scalability of the Solution	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. If an intricacy arises parents can see some of the attributes like the location, temperature and heartbeat of

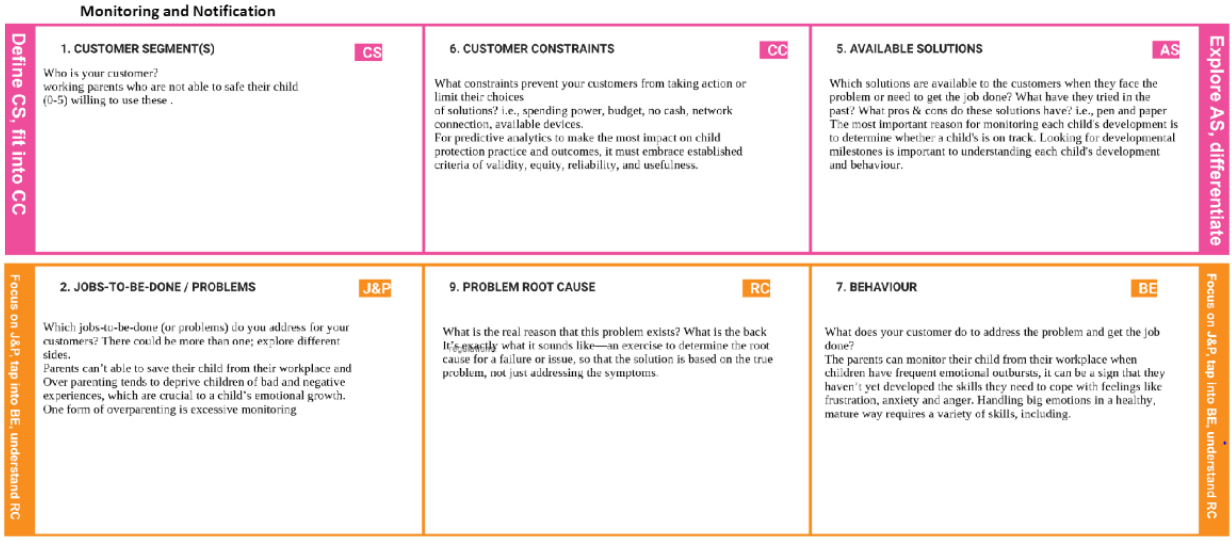
		the child along with living perspective around the children without deterrence.

3.3 Problem solution fit:

Project Design Phase-I Solution Fit Template



Monitoring and Notification



4 REQUIREMENT ANALYSIS

a. Functional requirement

The following are the functional requirements of the proposed system.

FR-1	User Registra on	✓ Registra on through Gmail ✓ Registra on through phone number
FR-2	User Confirma on	✓ Confirma on via Email ✓ Confirma on via OTP
FR-3	App installa on	✓ Installa on through link ✓ Installa on through play store
FR-4	Se ngs geofence	✓ Se ng by user to find child loca on
FR-5	Detec ng child loca on	✓ Detec ng loca on via app ✓ Detec ng loca on via SMS
FR-6	User Interface	✓ User Login Form. ✓ Admin Login Form.

b. Non functional requirement

The following are the non functional requirements of the proposed system.

FR-8	GPS tracking	The system is implemented with a GPS module, which acquires the location on information on of the user and stores it to the database.
FR-9	GPS modules	t receives data directly from satellites.
FR-10	Battery Life	I f the child or parent forgets to charge the device for a whole day then also the device will work. That's why we aim to make this device last the whole day with one charge. It should be long-las ng.

5 PROJECT DESIGN

5.1 BLOCK DIAGRAM

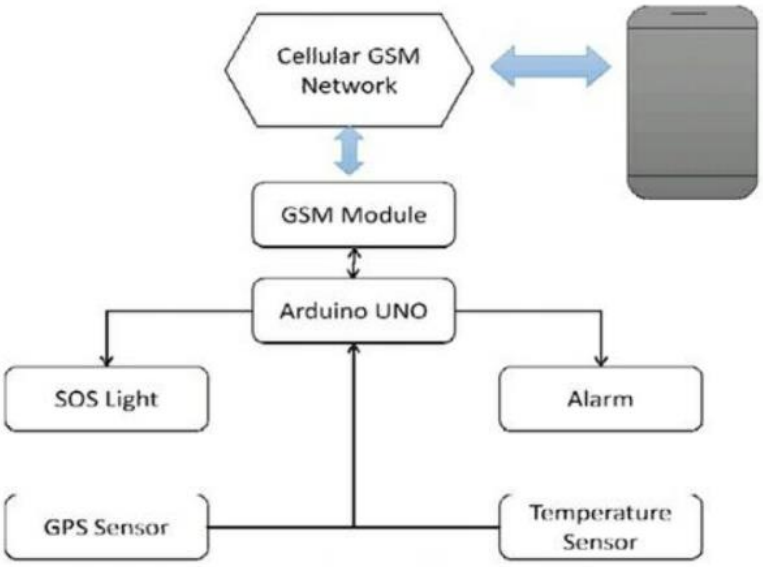


Fig 2 Architecture

a)Aurdino UNO:

The Arduino UNO is a standard board of Arduino. Here UNO means 'one' in Italian. It was named as UNO to label the first release of Arduino Software. It was also the first USB board released by Arduino. It is considered as the powerful board used in various projects. Arduino.cc developed the Arduino UNO board. Arduino UNO is based on an ATmega328P microcontroller. It is easy to use compared to other boards, such as the Arduino Mega board, etc. The board consists of digital and analog Input/Output pins (I/O), shields, and other circuits. The Arduino UNO includes 6 analog pin inputs, 14 digital pins, a USB connector, a power jack, and an ICSP (In-Circuit Serial Programming) header. It is programmed based on IDE, which stands for Integrated Development Environment. It can run

on both online and offline platforms. The IDE is common to all available boards of Arduino.

b)Temperature sensor:

A temperature sensor is a device used to measure temperature. This can be air temperature, liquid temperature or the temperature of solid matter. There are different types of temperature sensors available and they each use different technologies and principles to take the temperature measurement. The working of a temperature meter depends upon the voltage across the diode. The temperature change is directly proportional to the diode's resistance. The cooler the temperature, lesser will be the resistance, and vice-versa. The resistance across the diode is measured and converted into readable units of temperature (Fahrenheit, Celsius, Centigrade, etc.) and, displayed in numeric form over readout units. In geotechnical monitoring field, these temperature sensors are used to measure the internal temperature of structures like bridges, dams, buildings, power plants, etc.

c)Geo-sensors

Wired together using *Geo Sensor Networks* they are one of the main components of smart cities and smart regions. Thus, they play an important role in geodesy, construction, energy and mobility sectors, as well as for monitoring and controlling systems of the environment, agriculture, forestry and many more. The focus of the module is to provide skills for analysis, concept development and implementation of IoT projects where data is collected using sensors, transmitted to the Internet using various network technologies, and managed, visualized and analyzed using open standards for Geo Sensor Networks.

d)GPS module

The Global Positioning System (GPS) is a satellite based navigation system that provides location and time information. The system is freely accessible to anyone with a GPS receiver and unobstructed line of sight to at least four of GPS satellites. A GPS receiver calculates its position by precisely timing the signals sent by GPS satellites. GPS is nowadays widely used and also has become an integral part of smart phones.

5.2 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. The various aspects involve:

- GPS
- Notify alert signal

5.3 TESTING

Each portion of the software is designed by discreet team members, and it is tested individually by the python unit testing IoT. After unit testing, all software sections are integrated and tried out ultimately, so the flask program can be run on any platform. The testing progression encompasses Alpha testing and Beta testing.

5.4 DEPLOYMENT

The flask application in the long run is distributed in the IAAS rostrum like IBM cloud assistance, so it can be run in HTTPS protocol alongside SSL. In the

deployment process, a real-time database is fastened on the edge of real time file storage.

5.5 SOLUTION ARCHITECTURE

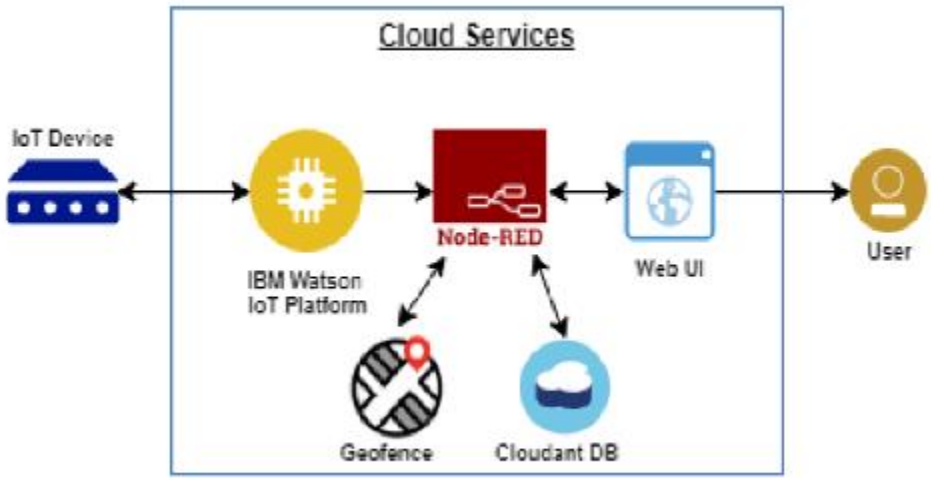


Fig 3 Technical Architecture

CATASTROPHIC FEATURES

- **ALARM RING:**

The safety system redirects a warning to your phone at any occasion, it determines any pursuit. Arming methodology decides which category of alerts you get.

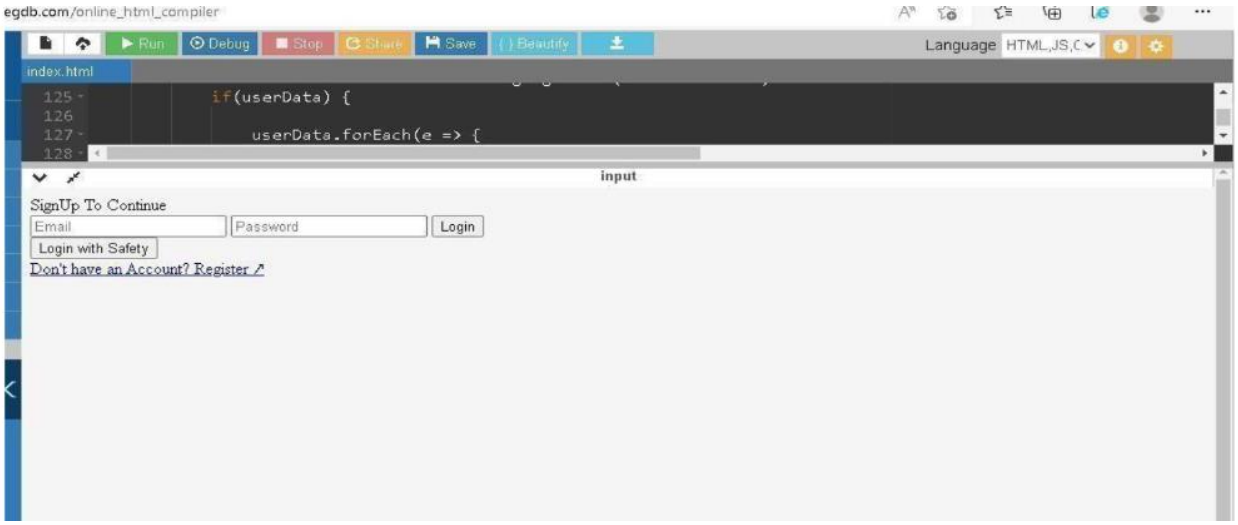
- **EMERGENCY NOTIFICATION:**

An emergency notification system is a labour saving mechanism to get in touch with a group of people within a corporation and assign salient information during a crisis.

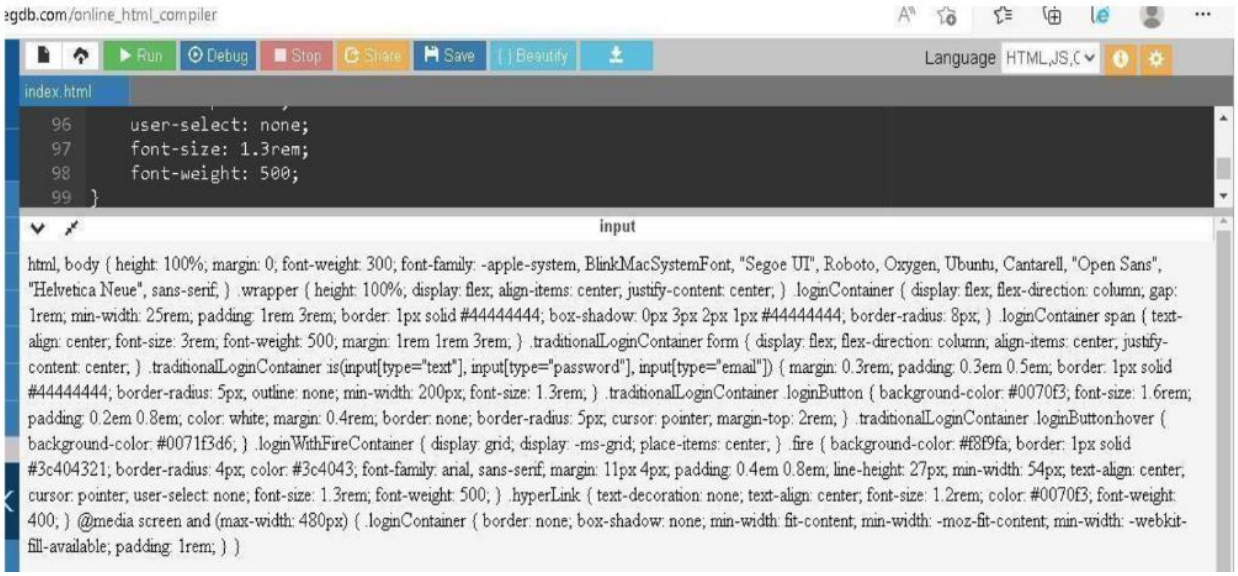
6 RESULTS

6.1 LOGIN PAGE

a)HTML:

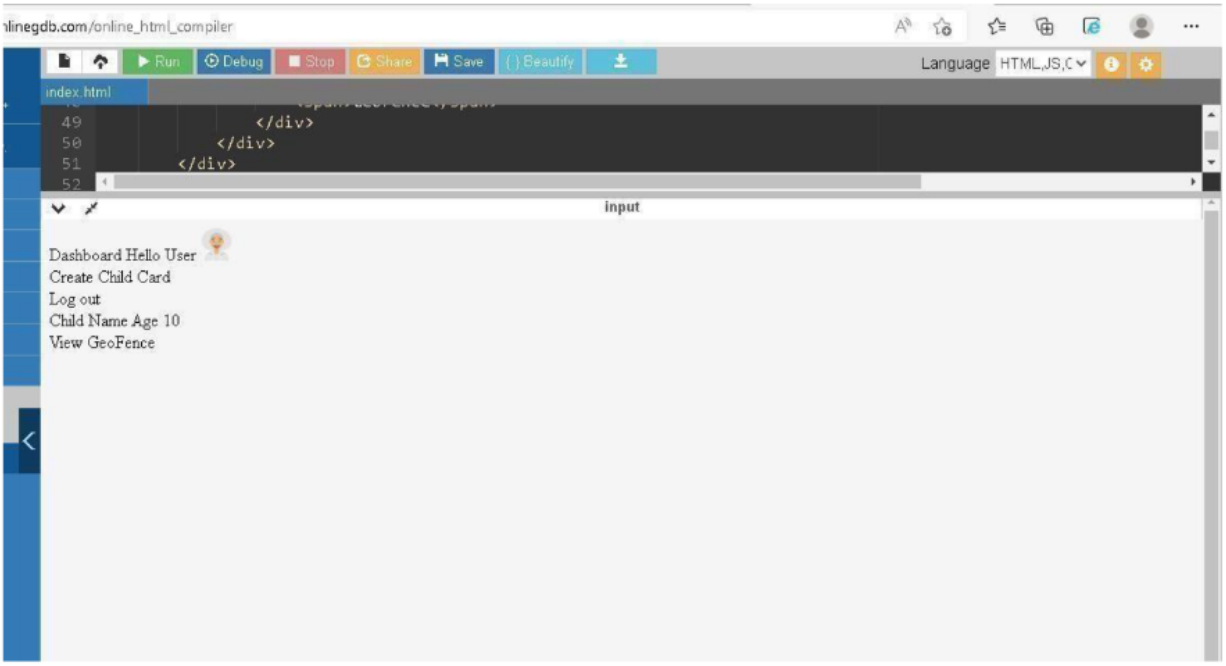


b)CSS:

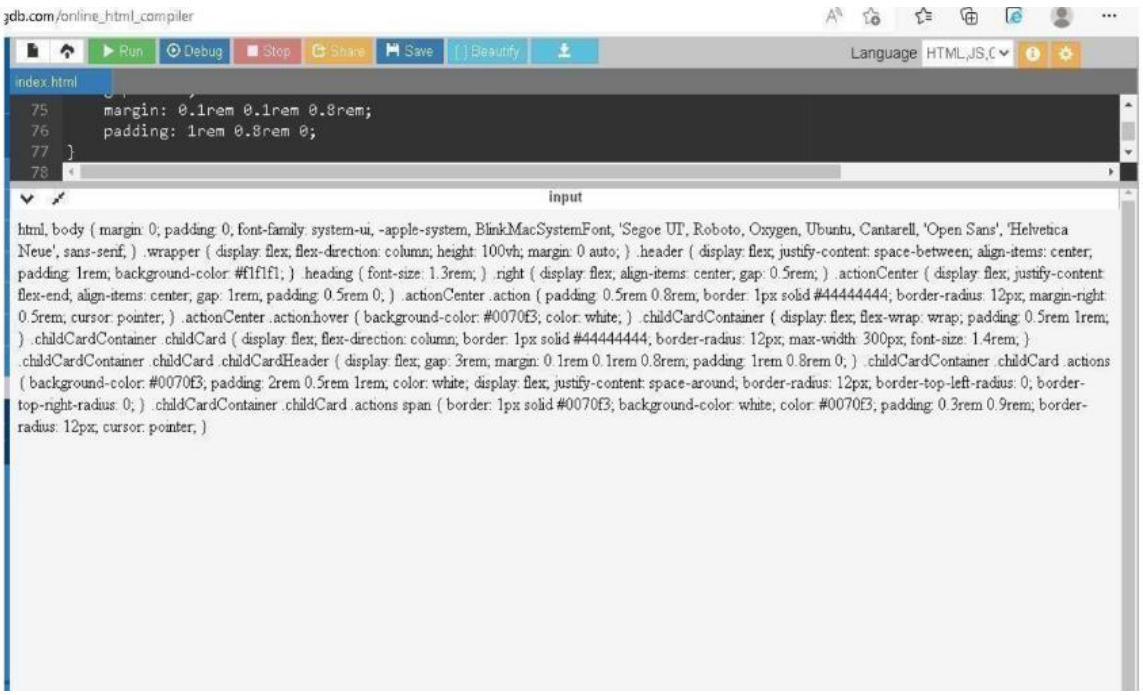


6.2 DASHBOARD

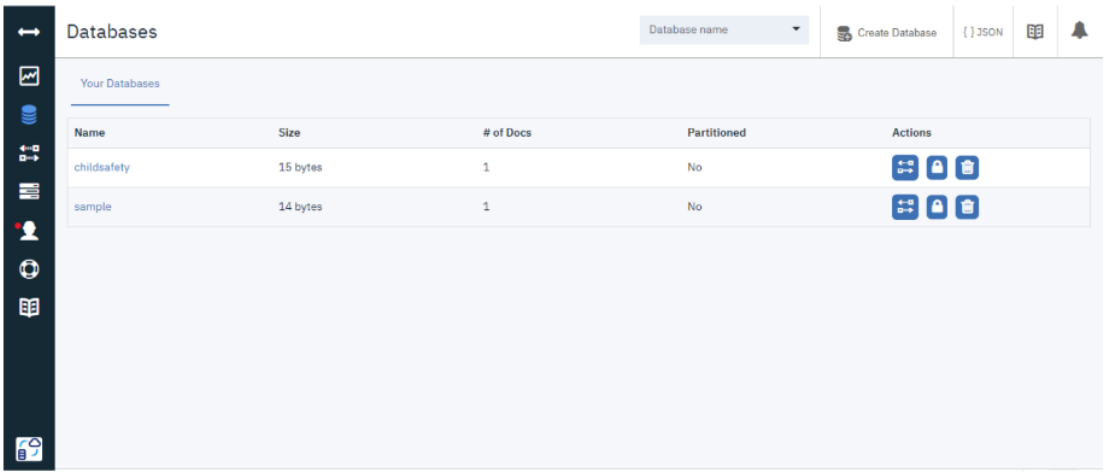
a)HTML:


linegdb.com/online_html_compiler
Run
Debug
Stop
Share
Save
{ } Beautify
Language
HTML,JS,C
index.html
49
50
51
52
input
Dashboard Hello User
Create Child Card
Log out
Child Name Age 10
View GeoFence

b)CSS:

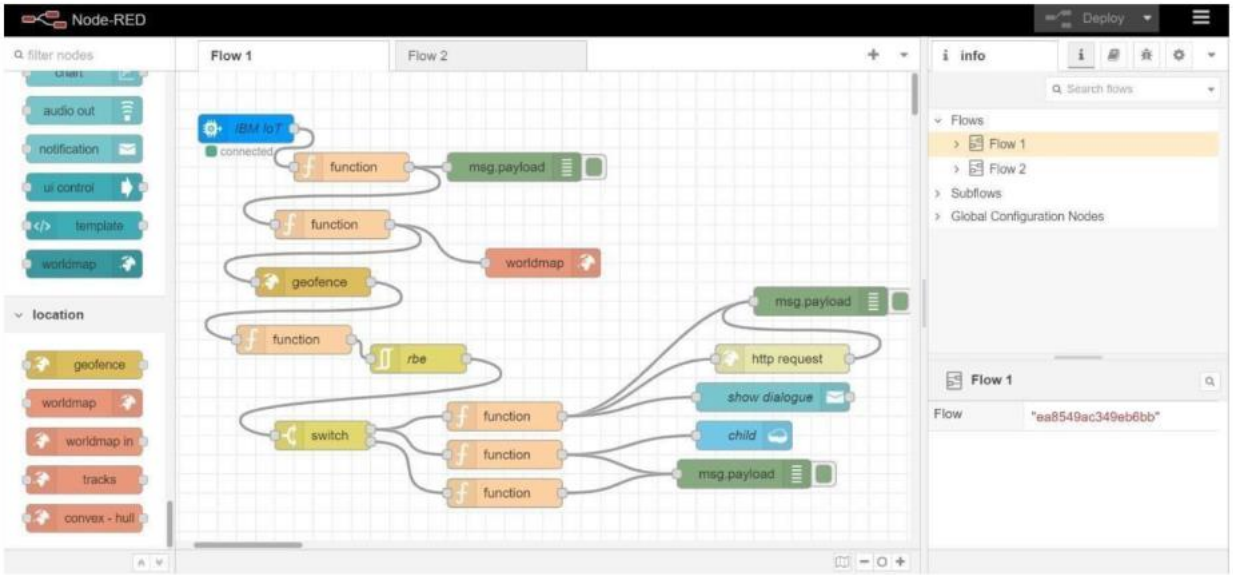

gdb.com/online_html_compiler
Run
Debug
Stop
Share
Save
{ } Beautify
Language
HTML,JS,C
index.html
75 margin: 0.1rem 0.1rem 0.8rem;
76 padding: 1rem 0.8rem 0;
77 }
78
input
html, body { margin: 0; padding: 0; font-family: system-ui, -apple-system, BlinkMacSystemFont, 'Segoe UI', Roboto, Oxygen, Ubuntu, Cantarell, 'Open Sans', 'Helvetica Neue', sans-serif; } .wrapper { display: flex; flex-direction: column; height: 100vh; margin: 0 auto; } .header { display: flex; justify-content: space-between; align-items: center; padding: 1rem; background-color: #f1f1f1; } heading { font-size: 1.3rem; } .right { display: flex; align-items: center; gap: 0.5rem; } .actionCenter { display: flex; justify-content: flex-end; align-items: center; gap: 1rem; padding: 0.5rem 0; } .actionCenter .action { padding: 0.5rem 0.8rem; border: 1px solid #44444444; border-radius: 12px; margin-right: 0.5rem; cursor: pointer; } .actionCenter .action:hover { background-color: #0070f3; color: white; } .childCardContainer { display: flex; flex-wrap: wrap; padding: 0.5rem 1rem; } .childCardContainer .childCard { display: flex; flex-direction: column; border: 1px solid #44444444; border-radius: 12px; max-width: 300px; font-size: 1.4rem; } .childCardContainer .childCard .childCardHeader { display: flex; gap: 3rem; margin: 0.1rem 0.1rem 0.8rem; padding: 1rem 0.8rem 0; } .childCardContainer .childCard .actions { background-color: #0070f3; padding: 2rem 0.5rem 1rem; color: white; display: flex; justify-content: space-around; border-radius: 12px; border-top-left-radius: 0; border-top-right-radius: 0; } .childCardContainer .childCard .actions span { border: 1px solid #0070f3; background-color: white; color: #0070f3; padding: 0.3rem 0.9rem; border-radius: 12px; cursor: pointer; }

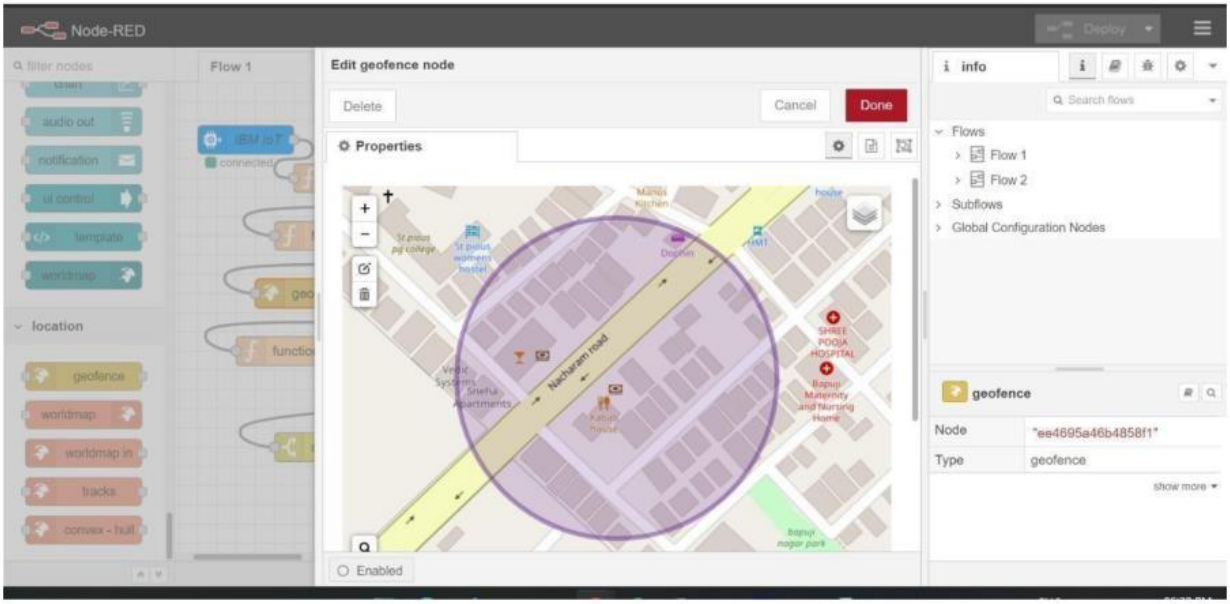
6.3 DATABASE:



6.4 NODE RED

Node Red platform is where the necessary connections are made and it is deployed to acquire the desired output.





7 ADVANTAGES AND DIS-ADVANTAGES

a) Advantages

- Trace whereabouts and minimise the Tragedy
- Create unassailable environment
- Toddlers in hamlet and metropolis can be saved
- Ceaseless Surveillance and instantaneous notification regime
- High dependability and data accuracy
- Eradicates ambiguity and Pays way for a tech-driven community

b) Disadvantages

- Inadequate battery supply leads to switching off the device
- Impractical to use the device forever
- Improper connectivity
- Improper weather conditions

- Misplacement or losing the tag
- Over usage of data

8 CONCLUSION

The System put forward this paper to ensure the safety of children and increase their confidence. Many experimenters are operating in this area and have formulated different technologies to aid children. The key represented in this paper takes the advantage of smart phones which proposes affluent elements like Google maps, SMS, etc. The child safety and protection device is proficient in acting as a smart IoT device. It equips parents with real-time location, the surrounding temperature, and along with an alarm buzzer for their child's circumstances and the capability to locate their child. This paper depicts the fundamental design concept and functionality along with the anticipated consequences. The application aside from conceding you to track down your children when they're within Bluetooth range, it also functions when your kids go farther afield. Its competence as a tracker is outstanding and if you live in densely populated areas like cities or big towns. This means you will be able to see the identity of the participating devices and It helps to diminish their vulnerability in harmful situations and also protects the children in emergency situations. Parents take measures both at home and outdoors to safeguard their kids from hurting themselves. But sometimes, it's impossible to pre-empt what can cause a treacherous encounter. However, it's possible to prevent such hazards with some forethought and simple measures using these safety gadgets.

9 APPENDIX

GitHub Project Demo link:

https://github.com/IBM-EPBL/IBM-Project-24237-1659940339