

**IOT-BASED SAFETY GADGET FOR CHILD SAFETY  
MONITORING AND NOTIFICATION  
PROJECT REPORT - NALAIYATHIRAN**

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## **1. INTRODUCTION**

Child Protection is about protecting children from or against any perceived danger or risk to their life, their personhood and childhood. It is about reducing their vulnerability to any kind of harm and protecting them in harmful situations. It is about ensuring that no child falls out of the social security and safety net and, those who do, receive necessary care, protection and support so as to bring them back into the safety net. While protection is a right of every child, some children are more vulnerable than others and need special attention. In addition to providing a safe environment for these children, it is imperative to ensure that all other children also remain protected. Child protection is integrally linked to every other right of the child. Failure to ensure children's right to protection adversely affects all other rights of the child.

### **1.1 PROJECT OBJECTIVE**

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 geofence around the particular location. By continuously checking the child's location notifications will be generated if the child crosses the geofence. 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.

### **1.2 PURPOSE**

If a child leaves a geofenced area, an application installed on the device can trigger various actions, such as sending real-time notifications of the device's whereabouts, encrypting data on the device or disabling sensitive functions. When a violation of child safety is identified, a certain sensor in the child module will emit a signal, which is the main function of the suggested child tracking system. These sensors will send this signal to the microcontroller, which will then send it to the transmitter, which will then send it to the parent module. The decision will be made by the parent module, and the violation handling procedure will begin.

## **2. LITERATURE SURVEY**

### **2.1 Existing Problem**

Child Trafficking are the major issue we are dealing with. There won't be any proper solution given and protecting the child and prevent from those situation. 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 peoples. GPS is used to track the live location and it is used when needed. The server will search the respective device ID from the database and search for respective contacts according to that device ID and helps in alerting the registered guardians.

## **2.2 References**

**[1]" RFID-based System for School Children Transportation Safety Enhancement ", Proceedings of the 8th IEEE GCC Conference and Exhibition, Muscat, Oman, 1-4 February 2015.**

This paper presents a system to monitor pick-up/drop-off of school children to enhance the safety of children during daily transportation from and to school. The system consists of two main units, a bus unit, and a school unit. The bus unit the system is used to detect when a child boards or leaves the bus. This information is communicated to the school unit that identifies which of the children did not board or leave the bus and issues an alert message accordingly. The system has a developed web-based database-driven application that facilitates its management and provides useful information about the children to authorized personnel. A complete prototype of the proposed system was implemented and tested to validate the system functionality. The results show that the system is promising for daily transportation safety.

**[2] Prof. Sunil K Punjabi, Prof. Suvarna Chaure, "Smart Intelligent System for Women and Child Security" Department of Computer Engineering SIES Graduate School of Technology Nerul, Navi Mumbai, India.**

A portable device which will have a pressure switch. As soon as an assailant is about to attack the person or when the person senses any insecurity from a stranger, he/she can then put pressure on the device by squeezing or compressing it. Instantly the pressure sensor senses this pressure and a conventional SMS, with the victim's location will be sent to their parents/guardian cell phone numbers stored in the device while purchasing it, followed by a call. If the call is unanswered for a prolonged time, a call will be redirected to the police and the same message will be sent. Additionally, if the person crosses some area which is usually not accessed by the person then a message with the real-time location is sent to the parent/guardian's phone via conventional SMS.

**[3]AkashMoodbidri, Hamid Shahnasser (Jan 2017) 'Child safety wearable device', International Journal for Research in Applied & Engineering Technology, Vol. 6 Issue II, IEEE, pp. 438- 444.**

Parents need not have a smart mobile. Set of keywords are used to gain information from the kit. LOCATION keyword is used to obtain the location of the child. UV keyword is used to obtain the temperature of the surroundings. BUZZ keyword is used to turn on the buzzer which is fixed in that device. SOS is used to send a signal to the device.

[4] Pramod, M UdayBhaskar, Ch V and Shikha, K. (January 2018) 'IOT wearable device for the safety and security of women and girl' International Journal of Mechanical Engineering and Technology, Vol 9, Issue 1, pp. 83-88.

The aim of this work is to develop a wearable device for the safety and protection of women and girls. This objective is achieved by the analysis of physiological signals in conjunction with body position. The physiological signals that are analyzed are galvanic skin resistance and body temperature. Body position is determined by acquiring raw accelerometer data from a triple axis accelerometer. Acquisition of raw data is then followed by activity recognition which is a process of employing a specialized machine learning algorithm. Real-time monitoring of data is achieved by wirelessly sending sensor data to an open source Cloud Platform. Analysis of the data is done on MATLAB simultaneously. This device is programmed to continuously monitor the subject's parameters and take action when any dangerous situation presents itself. It does so by detecting the change in the monitored signals, following which appropriate action is taken by means of sending notifications/alerts to designated individuals.

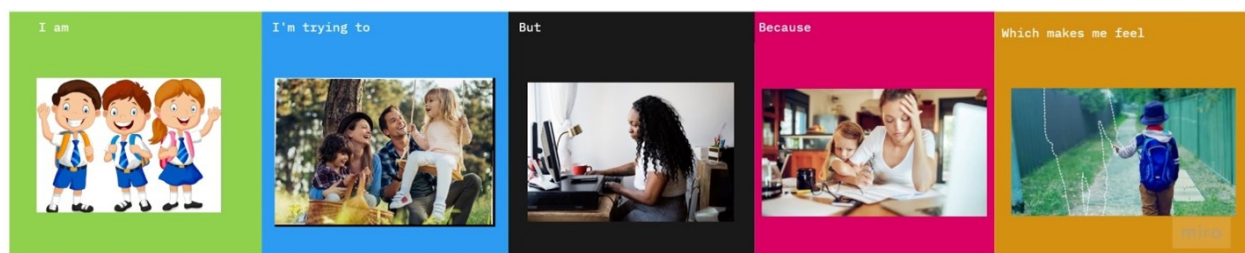
### 2.3 Problem Statement Definition

The main issues nowadays are children trafficking. Parental care is majorly missing since both of them are working. Child Health condition has to be taken care and to solve these problems this child safety monitoring and notification came into account.

#### PROBLEM STATEMENT I



#### PROBLEM STATEMENT II

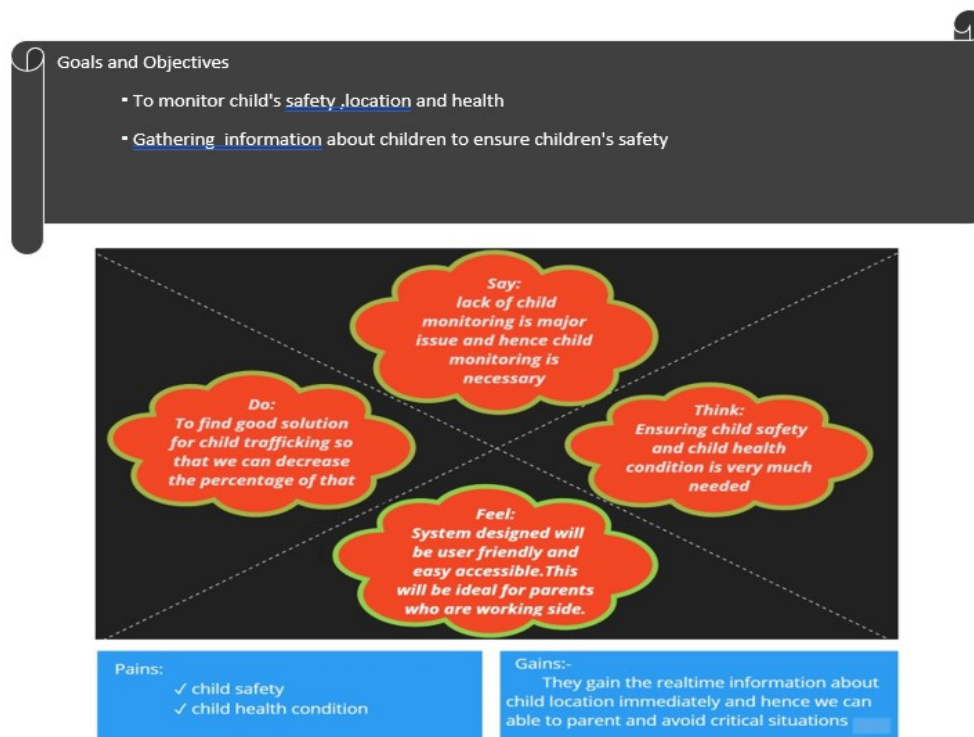


### 3. IDEATION & PROPOSED SOLUTION

Ideation is a creative process where designers generate ideas in sessions (e.g., brainstorming, worst possible idea). It is the third stage in the Design Thinking process. Participants gather with open minds to produce as many ideas as they can to address a problem statement in a facilitated, judgment-free environment.

#### 3.1 EMPATHY MAP CANVAS

An empathy map is a collaborative visualization used to articulate what we know about a particular type of user. It externalizes knowledge about users in order to 1) create a shared understanding of user needs, and 2) aid in decision making.




#### 3.2 BRAINSTORMING

Brainstorming is a group creativity technique by which efforts are made to find a conclusion for a specific problem by gathering a list of ideas spontaneously contributed by its members. This technique requires intensive, freewheeling discussion in which every member of the group is encouraged to think aloud and suggest as many ideas as possible based on their diverse knowledge. It is defined with three steps to explain the ideas.

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

Template



### Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

🕒 10 minutes to prepare  
🕒 1 hour to collaborate  
👤 2-8 people recommended

➕

#### Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕒 10 minutes

A

##### Team gathering

Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B

##### Set the goal

Think about the problem you'll be focusing on solving in the brainstorming session.

C

##### Learn how to use the facilitation tools

Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

1


#### Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕒 5 minutes

#### PROBLEM STATEMENT

The main issues nowadays are children trafficking. Parental care is majority missing since both of them are working. Child Health condition has to be taken care and to solve these problems this child safety monitoring and notification came into account. 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.



#### Key rules of brainstorming

To run an smooth and productive session

🗨️ Stay in topic.	💡 Encourage wild ideas.
👂 Defer judgment.	👂 Listen to others.
🗣️ Go for volume.	👁️ If possible, be visual.



## Step-2: Brainstorm, Idea Listing and Grouping

**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!

**R.MADHAN DEEPAK**

Now-a-days attacks on children are increasing at an unprecedented rate where they are not allowed to contact the family members

The key idea planned in this research work is an advanced technology that offers "Smart Child Safety" for the children.

Therefore, the awareness of this method is to send an SMS from children's wear device to their parent or guardian

Thus, the proposed method will be highly effective when compared to the other existing techniques

In the existing structure, there is no monitoring method for child. I should create many problems for them and the no protection mechanism to protect the child from the interference

In addition, there is no aware device for the child's protection

**I. STEPHEN HEART**

This project recommends a new targeted technology for child protection by using GSM as that the children will not feel discomfort while using such social problems

The key idea planned in this research work is an advanced technology

Moreover, it doesn't need any manual operation.

The problems were solved here using Arduino UNO, GSM sensors, MMS, temperature and panic button by using GPRS

The secondary measure implemented was using a bright SOS Light and alarm which is present on the wearable device which when activated by the parents via SMS

In such case, instant SMS track the best rate for children and sends the emergency message by using the GSM to their contacts.

**V.C PRAVEEN**

Therefore, the wearable device implemented in this project will be effectively communicating with the parent via SMS through GSM

This ensures that there is a secure communication also, communication of the wearable can be possible as per the mode by reprogramming the system

In future, the wearable devices can be extended to built on the SOC platform that helps to work more efficiently comparing with now

The wearable device acquires collection of data from the various modules that are connected to it

The latitude and longitude coordinates (provided) are stored in the cloud Database which can be saved for future references

The parent can find out the location of the child by alarm sound in a very loud alarm using this wearable device

**DHARMARAJ**

The Bluetooth module is a low-power module. The main disadvantage for this Bluetooth module is that it requires Bluetooth as the type of communication between parent and the child

Text should display the SOS signal brightly and sound an alarm which a bystander can easily spot as a sign of distress

This utilizes a Arduino system along with a sensor system and Bluetooth 4.1 module

The project focuses on a smart wearable device used for children. The main benefit of this wearable compared to other wearables is

The main idea of this wearable safety system is to aid the parents in finding their child very easily

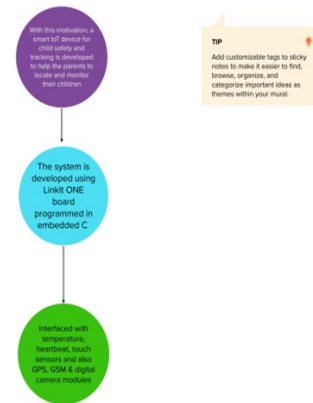
Hence this paper aims at providing parents with a sense of security for their child in today's time

**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 can break it up into smaller sub-groups.

20 minutes



## Step-3:IdeaPrioritization

4

### Prioritize

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

🕒 20 minutes



### 3.3 PROPOSED SOLUTION

The proposed solution and problem solution should relate the current situation to a desired result and describe the benefits that will accrue when the desired result is achieved.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	The main issues nowadays are children trafficking. Parental care is majorly missing since both of them are working .Child Health condition has to be taken care and to solve these problems this child safety monitoring and notification came into account.
2.	Idea / Solution description	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.
3.	Novelty / Uniqueness	Our Proposed system includes more safety features in the wearable gadgets and the coverage of geo-fence is high comparing to existing system.
4.	Social Impact / Customer Satisfaction	CHILD: Return home safely without any hindrance. PARENTS: They can be peaceful and monitor the status of their child from remote
5.	Business Model (Revenue Model)	Highly recommended model due to its advanced features and can be affordable. Its user friendly nature makes this more popular in market.
6.	Scalability of the Solution	The proposed model is IOT based and hence it will support more number of devices without any degradation in the quality of performance

### 3.4 PROBLEM SOLUTION FIT

#### Problem statement

1. If a device leaves a geofenced area, an application installed on the device can trigger various actions, such as sending real-time notifications of the device's whereabouts, encrypting data on the device or disabling sensitive functions

Problem-Solution Fit canvas			Purpose / Vision	Version
Define CS, PR into CL	<b>1. CUSTOMER SEGMENT(S)</b> <span>CS</span> <ul style="list-style-type: none"> <li>Parents</li> <li>Teachers</li> <li>Police</li> </ul>	<b>6. CUSTOMER LIMITATIONS</b> <span>CL</span> <small>EG. BUDGET, DEVICES</small> <ul style="list-style-type: none"> <li>Device cost is high due to real time monitoring</li> </ul>	<b>5. AVAILABLE SOLUTIONS</b> <span>AS</span> <small>PROS &amp; CONS</small> Pros: Can monitor in real time and update the child location and health condition on time Cons: In case of network issues there will be no proper communication	
	<b>2. PROBLEMS / PAINS</b> <span>PR</span> <small>+ ITS FREQUENCY</small> <ul style="list-style-type: none"> <li>Child Safety</li> <li>Child Health Condition</li> <li>Lack of real time monitoring</li> </ul>	<b>9. PROBLEM ROOT / CAUSE</b> <span>RC</span> Customers have to do this to protect their children from potential threats and to ensure the safety while being far away from them	<b>7. BEHAVIOR</b> <span>BE</span> <small>+ ITS INTENSITY</small> <ul style="list-style-type: none"> <li>Disrespectful Behavior.</li> <li>Struggles.</li> <li>Defiance</li> </ul>	
Focus on PR, Up into BE, understand RC	<b>3. TRIGGERS TO ACT</b> <span>TR</span> <ul style="list-style-type: none"> <li>To create awareness regarding Child Trafficking and to take care their health condition</li> </ul>	<b>10. YOUR SOLUTION</b> <span>SL</span> Building a reliable technology that can address all the customer needs while being reliable and secure ensuring efficient functioning	<b>8. CHANNELS of BEHAVIOR</b> <span>CH</span> ONLINE Tracking their kids location with their mobile phones GPS reading news about child safety  OFFLINE Customers accompany their children to ensure safety send them together with other reliable people, seek for protection in public places	
	<b>4. EMOTIONS</b> <span>EM</span> <small>BEFORE / AFTER</small> Before: Feeling insecure After: Feeling Secured		Extract online & offline CH of BE	

### 4. REQUIREMENT ANALYSIS

Requirement analysis is significant and essential activity after elicitation. We analyze, refine, and scrutinize the gathered requirements to make consistent and unambiguous requirements. This activity reviews all requirements and may provide a graphical view of the entire system. After the completion of the analysis, it is expected that the understandability of the project may improve significantly. There exists two kinds of requirements one is functional and other is non-functional requirements which is discussed below.

#### 4.1 FUNCTIONAL REQUIREMENT

Following are the functional requirements of the proposed solution is tabulated below.

<b>FR No.</b>	<b>Functional Requirement(Epic)</b>	<b>Sub Requirement (Story / Sub-Task)</b>
<b>FR-1</b>	User Registration and User Confirmation	<ol style="list-style-type: none"> <li>1. Registration throughGmail</li> <li>2. Registration through phone number</li> <li>3. Confirmation via Email</li> <li>4. Confirmation viaOTP</li> </ol>
<b>FR-2</b>	App installation and Detecting Child location	<ol style="list-style-type: none"> <li>1. Installation throughlink</li> <li>2. Installation throughplay store</li> <li>3. Detecting location via app</li> <li>4. Detecting location via SMS</li> </ol>
<b>FR-3</b>	Database	<ol style="list-style-type: none"> <li>1. Stored in cloud forseamless connectivity.</li> <li>2. Parents and kids link with the distance andthe location values obtained from the mobile devices are storedhere.</li> <li>3. The values include parent id, kid id,distance, longitude, latitude etc.</li> </ol>
<b>FR-4</b>	Server	<ol style="list-style-type: none"> <li>1. It connects the database and the frontend application.</li> <li>2. The backend server has been implemented to run as a service and is deployed in an IBM cloud instance.</li> <li>3. Thebackend server has been implemented to run as a service and is deployed in an IBM cloud instance.</li> </ol>
<b>FR-5</b>	Battery Life	<ol style="list-style-type: none"> <li>1. If the child or parent forgetsto charge the device for a wholeday then also the device will work. That's why we aim to make this device Blast the wholeday with one charge.</li> <li>2. It should be long-lasting.</li> </ol>
<b>FR-6</b>	<b>Location History</b>	<ol style="list-style-type: none"> <li>1. Location history will help to track the child's activity so that they aren't will be updated. Location history will be there for30days.</li> </ol>

## 4.2 NON-FUNCTIONAL REQUIREMENTS

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Device have GSM can help to inform the parents or relatives about the current situations of the child by deliver the message immediately to save the child.
NFR-2	Security	Make children parents more assure about their kid's security, we have a feature in our device called Geo- Fence. Whenever your child crosses that specific area, you will get an instant notification on your phone.
NFR-3	Reliability	1. Portable 2. Easy to use 3. Flexibility
NFR-4	Performance	Create a Child tracker which helps the parents with continuously monitoring the child's location. The notification will be sent according to the Child's location to their parents or caretakers. The entire location data will be stored in the database.
NFR-5	Availability	1. Track your child even in a crowd 2. Get travel details of kids at any time know the current location
NFR-6	Scalability	1. Gadget ensures the safety and tracking of the children. 2. Parents need not worry about their children.

## 5. PROJECT DESIGN

Project design is an early phase of a project where the project's key features, structure, criteria for success, and major deliverables are planned out. The aim is to develop one or more designs that can be used to achieve the desired project goals. Stakeholders can then choose the best design for the execution of the project. The project design steps might generate various outputs, such as sketches, flowcharts, site trees, HTML screen designs, prototypes, photo impressions, and more.

### 5.1 DATA FLOW DIAGRAM

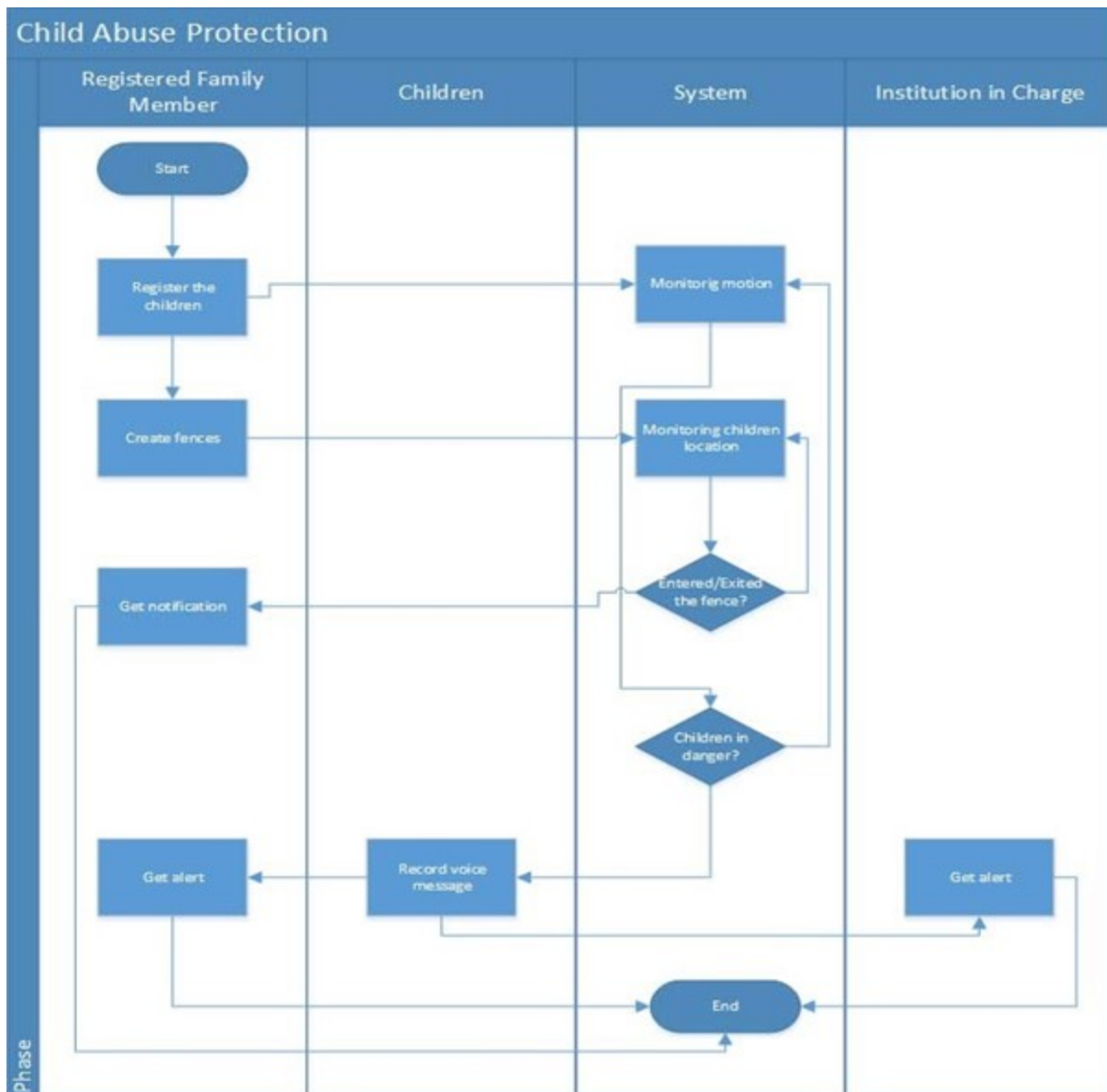
Data flow describes the information transferring between different parts of the systems. The arrow symbol is the symbol of data flow. A relatable name should be given to the flow to determine the information which is being moved. Data flow also represents material along with

information that is being moved. Material shifts are modeled in systems that are not merely informative. A given flow should only transfer a single type of information. The direction of flow is represented by the arrow which can also be bi-directional

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user) and (Web user)	Registration	USN-1	As a user, I can register my account by entering my email, password, and confirming my password.	I can access my account/ dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered myself	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through apple account	I can register & access the dashboard with apple account Login	High	Sprint-2
	Login	USN-4	As a user, I can log into the application by entering user id & password		High	Sprint-1
Customer Care Executive	Login		As I enter I can view the working of the application and scan for any glitches and monitor the operation and check if all the users are authorized.	I can login only with my provided credentials	Medium	Sprint - 3
Administrator	Login		Maintaining and making sure the database containing the locations are secure and accurate and updated constantly.	I can login only with my provided credentials	High	Sprint - 3

## DATA FLOW DIAGRAM

A data flow diagram (DFD) maps out the flow of information for any process or system. It uses defined symbols like rectangles, circles and arrows, plus short text labels, to show data inputs, outputs, storage points and the routes between each destination. Data flowcharts can range from simple, even hand-drawn process overviews, to in-depth, multi-level DFDs that dig progressively deeper into how the data is handled

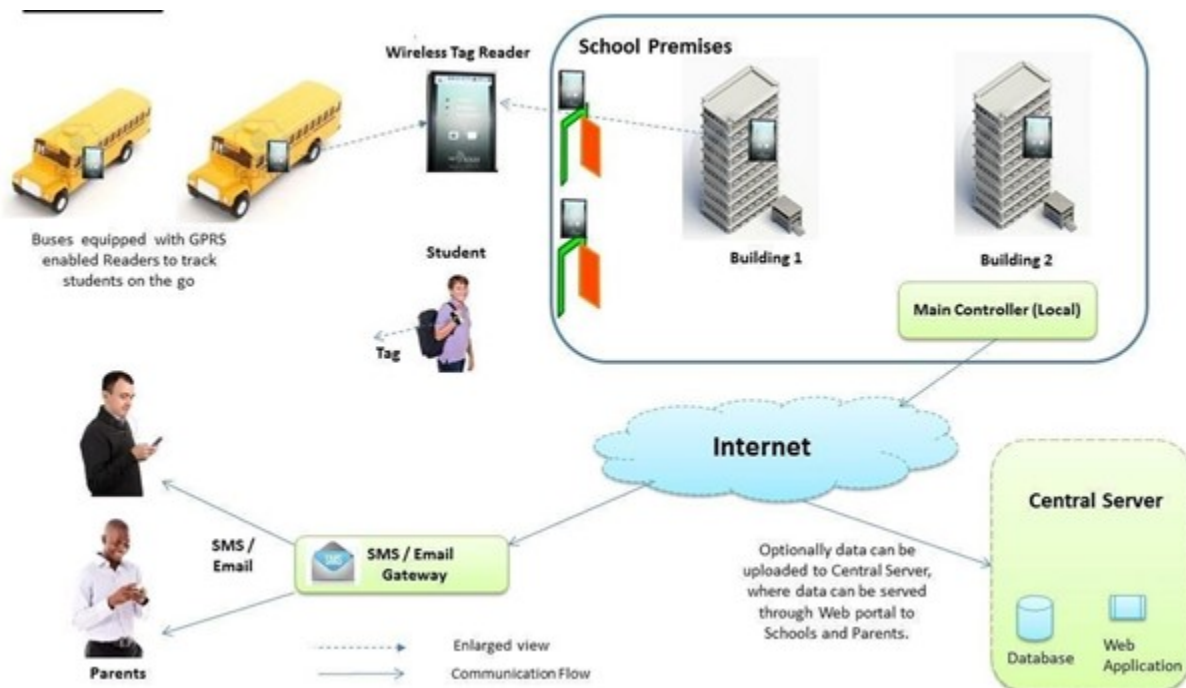




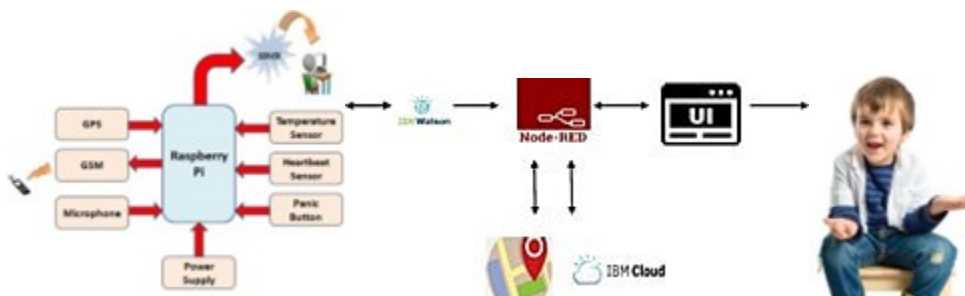
## 5.2 SOLUTION & TECHNICAL ARCHITECTURE

The term Technical architecture describes the formation of a structure by strategically assembling single components. In this process of assembling, the architect has to adhere to certain rules or requirements like legal constraints, financial constraints, or scientific laws. Technical architecture—which is also often referred to as application architecture, IT architecture, business architecture, etc.—refers to creating a structured software solution that will meet the business needs and expectations while providing a strong technical plan for the growth of the software application through its lifetime.

### I) SOLUTION ARCHITECTURE



### II) TECHNICAL ARCHITECTURE



### 5.3 USER STORIES

User Story Number	User Story / Task	Story Points
USN-1	As a user I need to enrol the cloud registration	3
USN-2	As a user, I will create IBM cloud account.	2
USN-3	After creating cloud account launch IBM Watson IOT platform by accessing cloud account	5`
USN-4	Create the node in IBM Watson platform	7
USN-5	After Creating node get device Type and id	1
USN-6	Simulate the node created	3
USN-7	As a user ,I can create Node-red by app deployment	5
USN-8	Connect IBM Watson with node red through API key	2
USN-9	Design the project flow using Node-Red	7
USN-10	Check for the proper connections and the output in the node red application	3
USN-11	Launch the Cloudant DB and Create database to store the location data	4
USN-12	Install the python software	2
USN-13	Develop the python scripts to publish details to IBM IoT Platform	6
USN-14	Integrate the device id, authentication token in python script	2
USN-15	Develop the python code for publishing the location (latitude & longitude) to IBM IoT Platform	8
USN-16	Develop the Web application using Node red	5
USN-17	Connect to the IBM IoT Platform and get the location and Store the data in the Cloudant	2
USN-18	Create the geofence and Google map for location identification	8
USN-19	Integrate the geofence and Google map to check if the child is inside or outside the geofence	11
USN-20	Send the notifications if the child is outside the geofence	4

## **6. PROJECT PLANNING & SCHEDULING**

### **6.1 SPRINT PLANNING & ESTIMATION**

- 1) Prerequisites.
  - IBM Cloud services
  - Software
- 2) Project Objectives.
  - Abstract
  - Brainstorming
- 3) Create and Configure IBM Cloud Services.
  - Create IBM Watson Iot Platform And Device
  - Create Node- Red Service
  - Create A Database In Cloudant DB
- 4) Develop the Python Script.
  - Develop A Python Script
- 5) Develop A Web Application Using Node-RED Service.
  - Develop The Web Application Using Node-RED
- 6) Ideation Phase.
  - Literature Survey on the Selected Project & Information Gathering
  - Prepare Empathy Map
  - Ideation
- 7) Project Design Phase -1
  - Proposed Solution - Prepare Solution Fit
  - Solution Architecture

- 8) Project Design Phase -2
  - Customer journey
  - Functional Requirement
  - Data Flow Diagram
  - Technology Architecture
  
- 9) Project planning Phase.
  - Prepare Milestones & Activity List
  - Sprint Delivery Plan
  
- 10) Project Development Phase.
  - Project Development-Delivery Of Sprint-1
  - Project Development-Delivery Of Sprint-2
  - Project Development-Delivery Of Sprint-3
  - Project Development-Delivery Of Sprint-4

## 6.2 SPRINT DELIVERY SCHEDULE

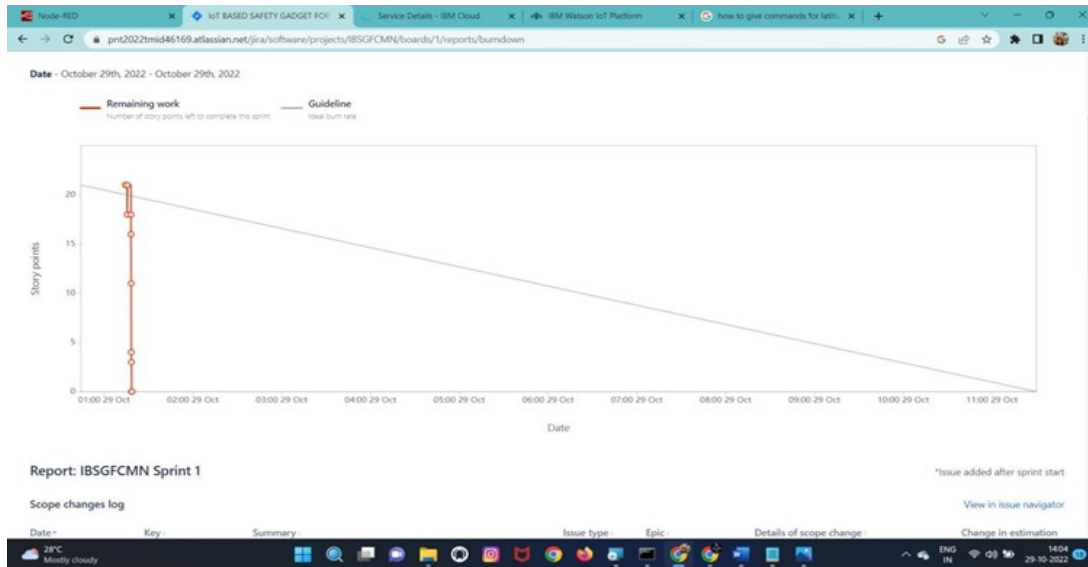
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Create and Configure IBM Cloud Services	USN-1	As a user I need to enrol the cloud registration	3	HIGH	V.C.PRAVE EN
Sprint-1		USN-2	As a user, I will create IBM cloud account.	2	MEDIUM	V.C.PRAVE EN
Sprint-1		USN-3	After creating cloud account launch IBM Watson IOT platform by accessing cloud account	5	HIGH	R.MADHAN DEEPAK
Sprint-1		USN-4	Create the node in IBM Watson platform	7	HIGH	I.STEPHEN HEART
Sprint-1		USN-5	After Creating node get device Type and id	1	LOW	DHARMAR AJ
Sprint-1		USN-6	Simulate the node created	3	MEDIUM	DHARMAR AJ
Sprint-2	Create and access Node-Red	USN-7	As a user ,I can create Node-red by app deployment	5	HIGH	R.MADHAN DEEPAK
Sprint-2		USN-8	Connect IBM Watson with node red through API key	2	LOW	V.C.PRAVE EN
Sprint-2		USN-9	Design the project flow using Node-Red	7	HIGH	DHARMAR AJ
Sprint-2		USN-10	Check for the proper connections and the output in the node red application	3	MEDIUM	I.STEPHEN HEART

Sprint-3	Create A Database in Cloudant DB	USN-11	Launch the Cloudant DB and Create database to store the location	4	HIGH	R.MADHAN DEEPAK
Sprint-3	Develop the Python script	USN-12	Install the python software	2	LOW	I.STEPHEN HEART
Sprint-3		USN-13	Develop the python scripts to publish details to IBM IoT Platform	6	HIGH	DHARMAR AJ
Sprint-3		USN-14	Integrate the device id, authentication token in python script	2	LOW	R.MADHAN DEEPAK
Sprint-3		USN-15	Develop the python code for publishing the location (latitude & longitude) to IBM IoT Platform	8	HIGH	V.C.PRAVE EN
Sprint-4	Create the Web application using Node Red	USN-16	Develop the Web application using Node red	5	HIGH	I.STEPHEN HEART
Sprint-4		USN-17	Connect to the IBM IoT Platform and get the location and Store the data in the Cloudant	2	MEDIUM	V.C.PRAVE EN
Sprint-4		USN-18	Create the geofence and Google map for location identification	8	HIGH	DHARMAR AJ
Sprint-4		USN-19	Integrate the geofence and Google map to check if the child is inside or outside the geofence	11	HIGH	R.MADHAN DEEPAK
Sprint-4		USN-20	Send the notifications if the child is outside the geofence	4	HIGH	I.STEPHEN HEART

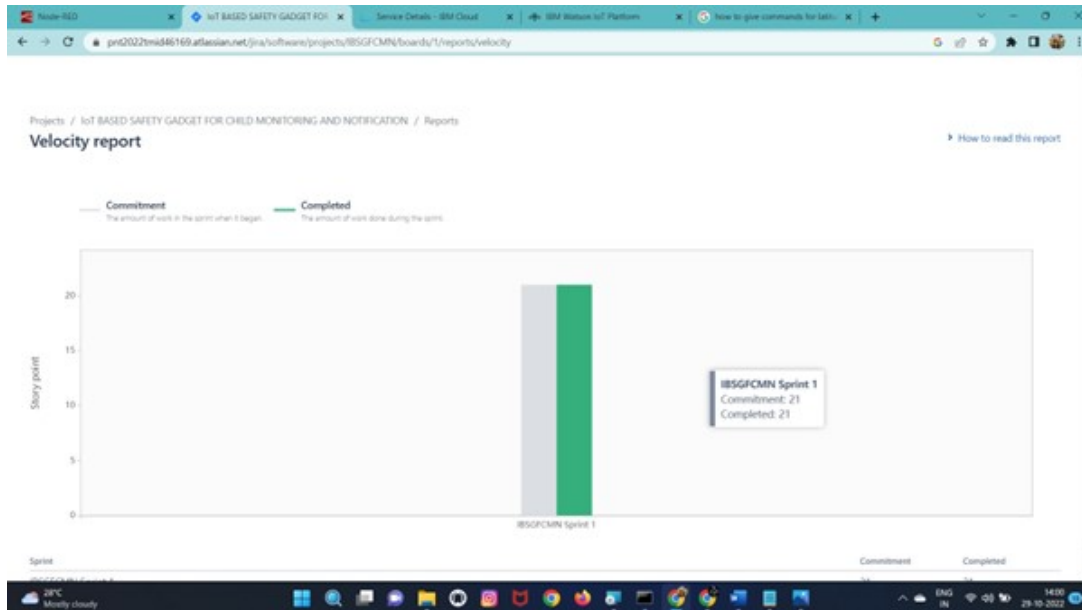
## 6.3 REPORTS FROM JIRA

### SPRINT 1

#### BURNDOWN CHART:

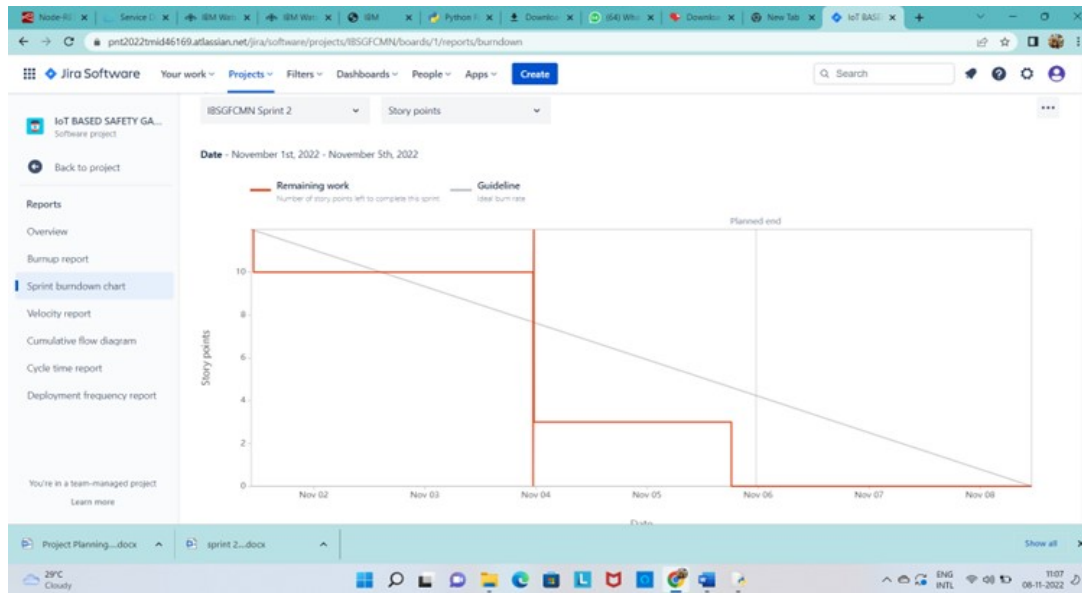


#### VELOCITY REPORT:

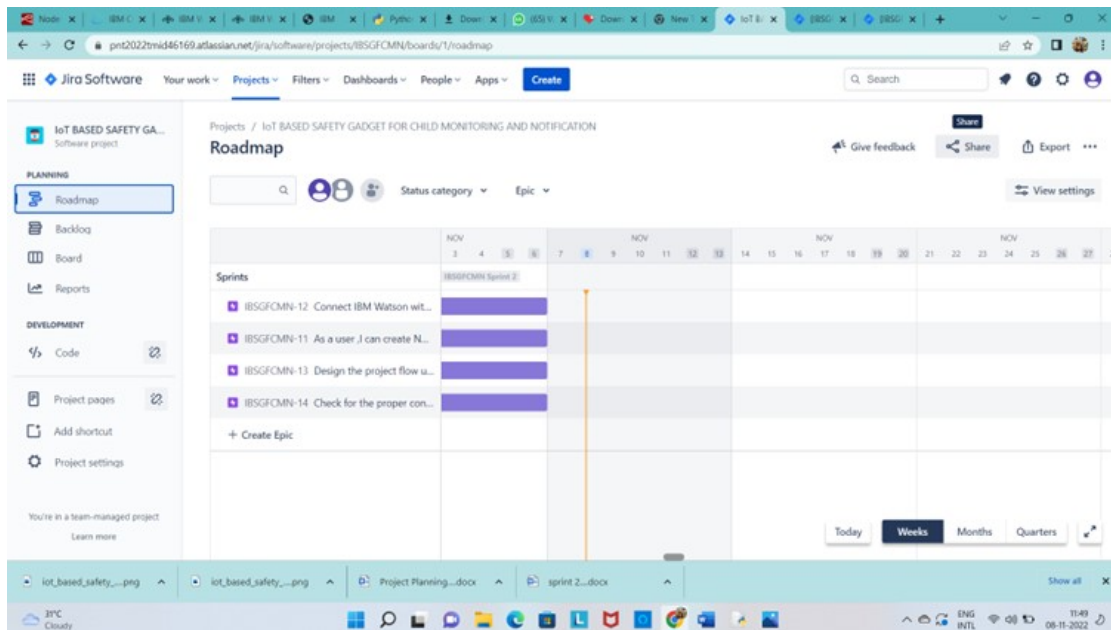


## SPRINT 2

### BURNDOWN CHART:

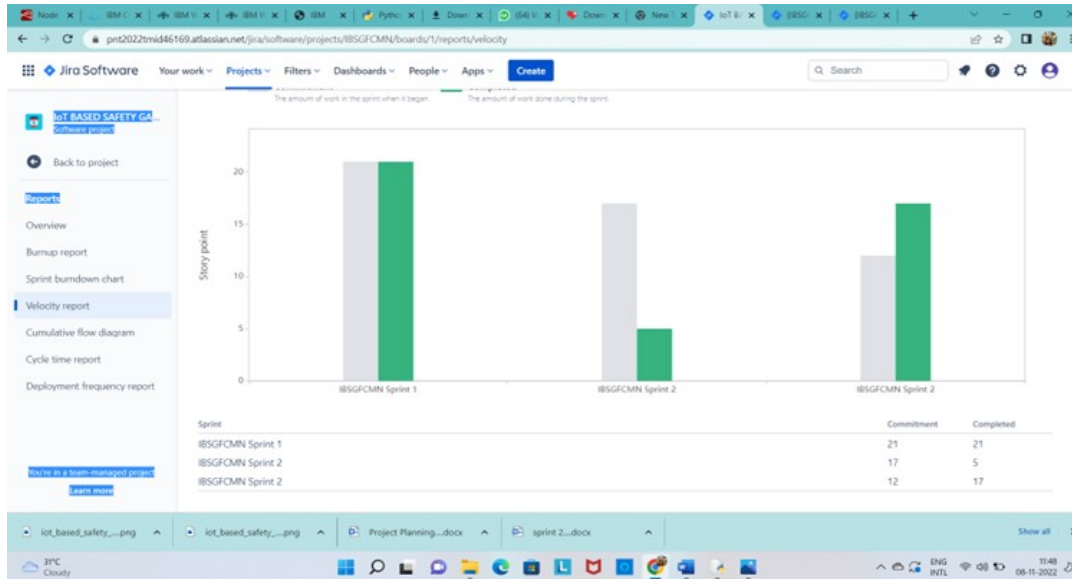


### ROADMAP:

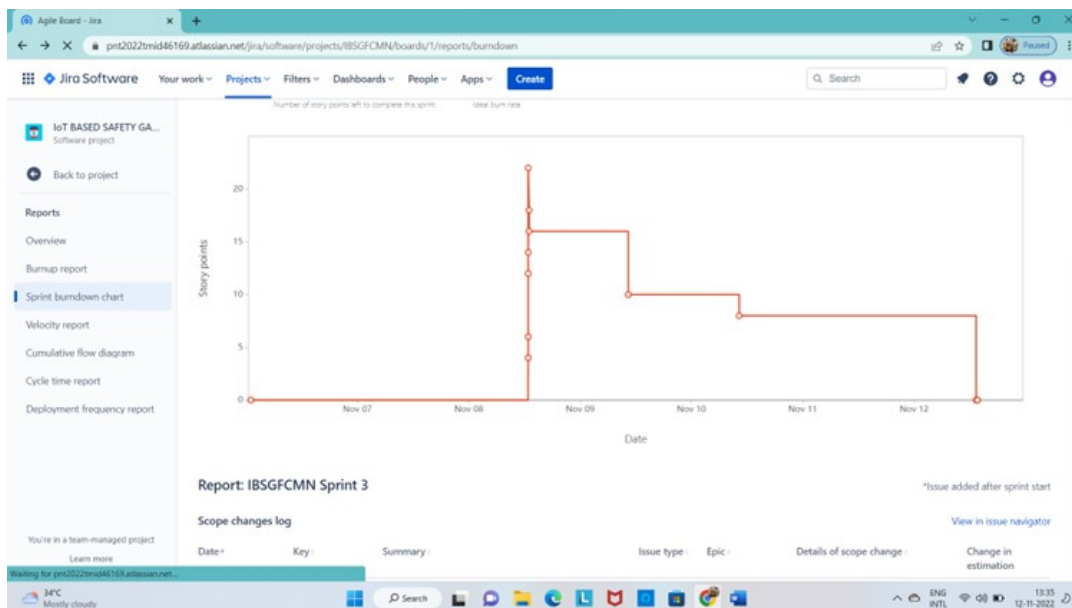




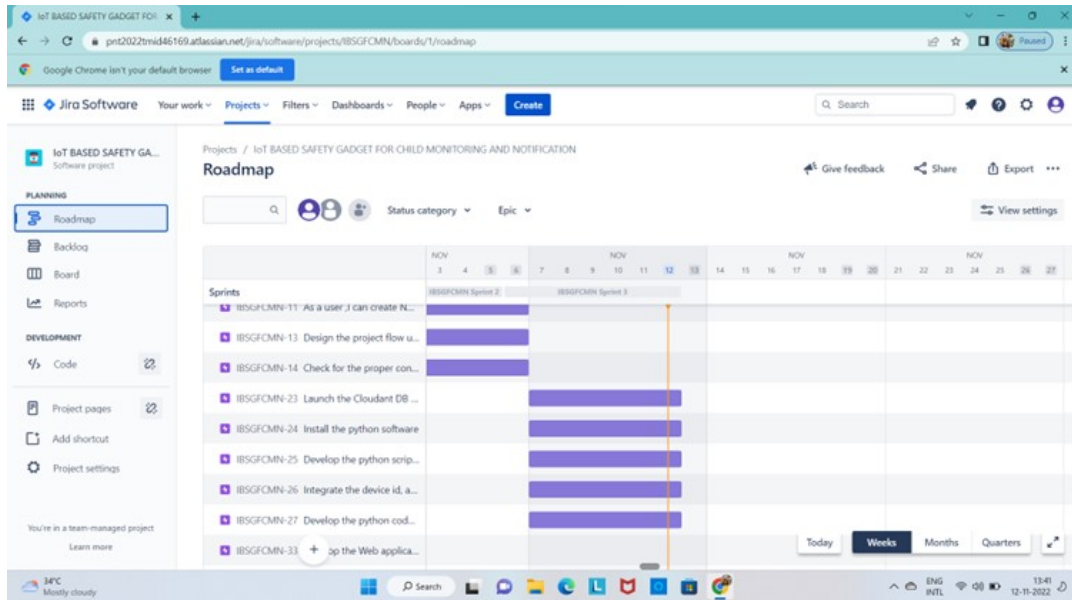
## VELOCITY REPORT:



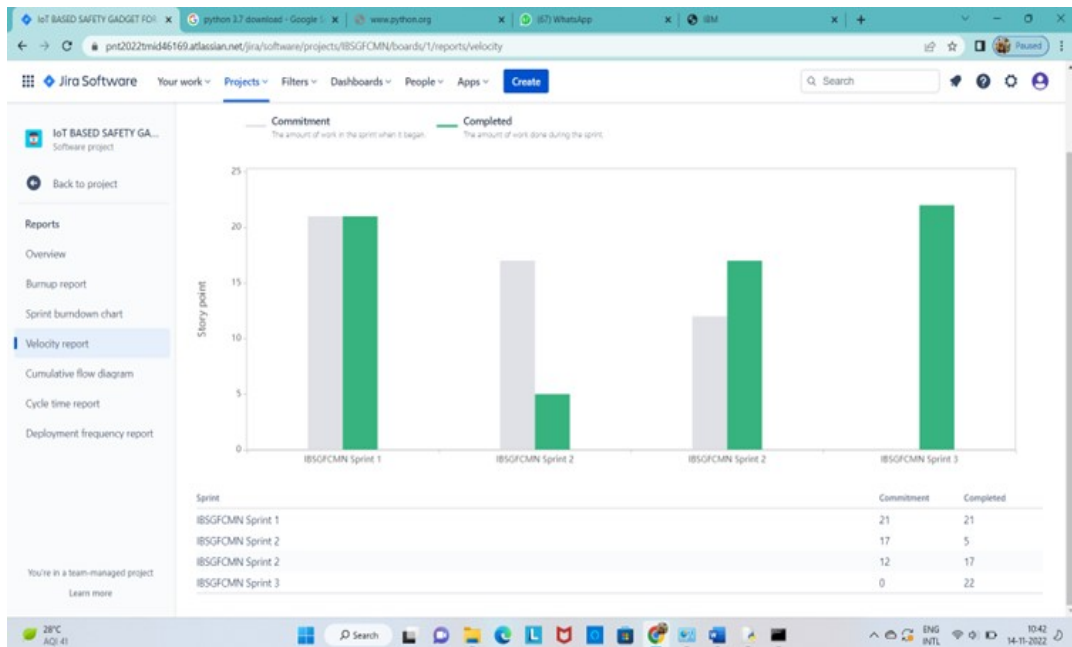
## SPRINT 3 BURNDOWN CHART:



## ROADMAP:

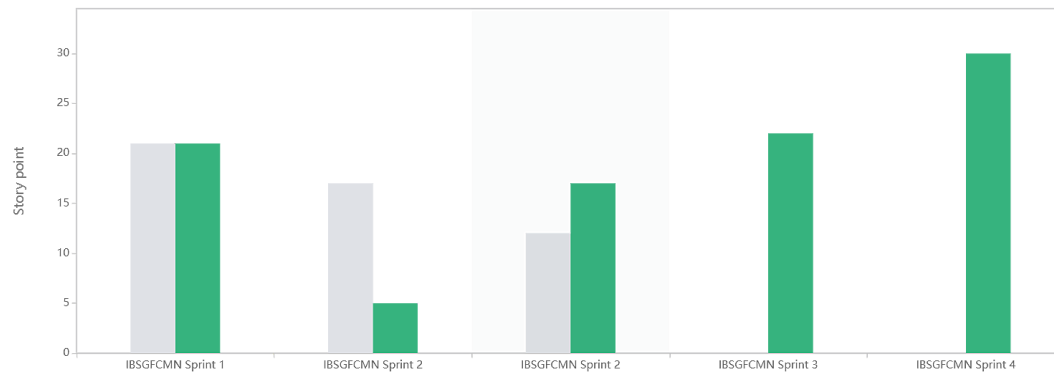


## VELOCITY REPORT:



## SPRINT 4

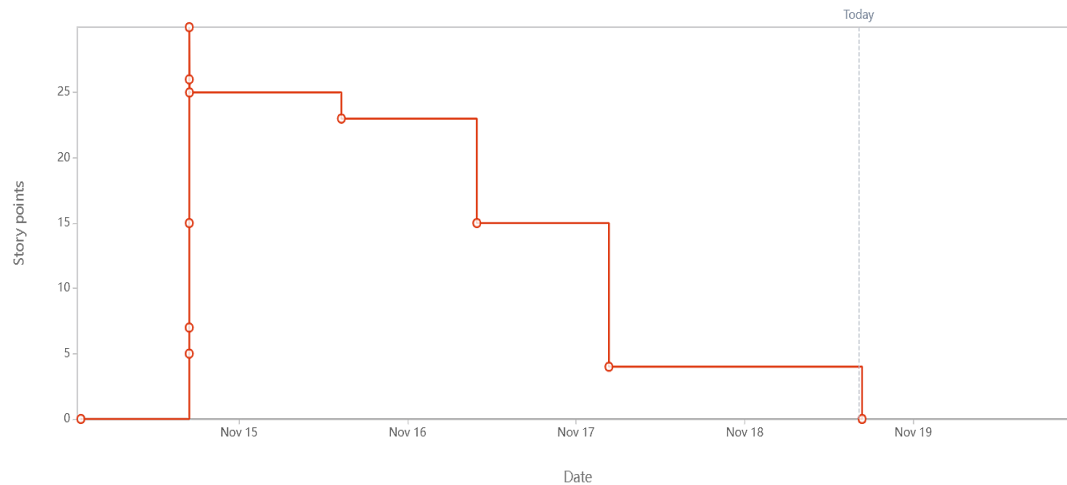
### BURNDOWN CHART:



### ROADMAP:

	T	NOV	DEC	JAN '23
Sprints		IBSG... IBSGF... IBSG...		
IBSGFCMN-12 Connect IBM Watson with node red t...				
IBSGFCMN-11 As a user ,I can create Node-red by...				
IBSGFCMN-13 Design the project flow using Node-...				
IBSGFCMN-14 Check for the proper connections an...				
IBSGFCMN-23 Launch the Cloudant DB and Create...				
IBSGFCMN-24 Install the python software				
IBSGFCMN-25 Develop the python scripts to publis...				
IBSGFCMN-26 Integrate the device id, authenticatio...				
IBSGFCMN-27 Develop the python code for publishl...				
IBSGFCMN-33 Develop the Web application using...				
IBSGFCMN-34 Connect to the IBM IoT Platform and...				
IBSGFCMN-35 Create the geofence and Google ma...				
IBSGFCMN-36 Integrate the geofence and Google...				
IBSGFCMN-37 Send the notifications if the child is o...				

## VELOCITY REPORT:



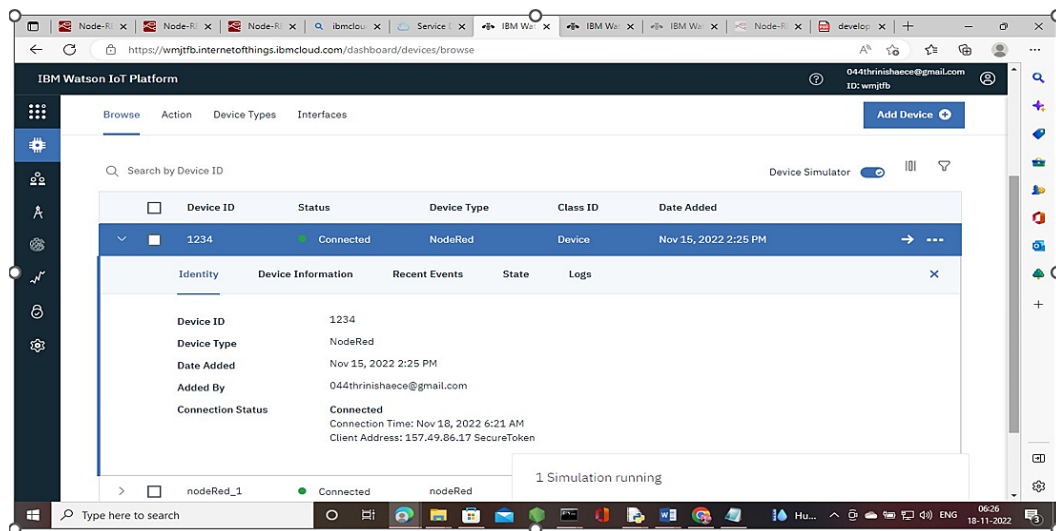
## 7. CODING & SOLUTIONING

Coding is a list of step-by-step instructions that get computers to do what you want them to do. Coding makes it possible for us to create computer software, games, apps and websites

### 7.1 FEATURE 1

#### IBM IoT WATSON

The very first process in this project section is to develop the IBM IoT Platform. This IoT platform is the core formula for all the connection process. As the only way of connecting several applications is the basic work of the cloud platform. The process of signing in to the cloud process is the large process which carries verification segments too. After creating the Cloud Process, let's move to device creation part.



## 7.2 FEATURE 2

### PYTHON

Our Python Code is very Simple and easy to understand. The programs carries our device details and the requirements of the project are kept defined. All conditions are made properly and the output is done successfully

```
import json
```

```
import wiotp.sdk.device
```

```
import time
```

```
myconfig = {
```

```
    "identity": {
```

```
        "orgId": "0rfzob",
```

```
        "typeId": "NODEREDMCU12",
```

```
        "deviceId": "987654321"
```

```
    },
```

```
    "auth": {
```

```
        "token": "0987654321"
```

```

    }
}
client = wiotp.sdk.device.DeviceClient(config=myconfig, logHandlers=None)
client.connect()
while True:
    name= "In
latitude= 10.929289384268262
longitude= 78.74765032731429

    #out area location
    #latitude= 17.4219272
    #longitude= 78.5488783
    myData={'name': name, 'lat':latitude, 'lon':longitude}
    client.publishEvent(eventId="status", msgFormat="json", data= myData,
qos=0),#onpublish=None
    print("Data published to IBM IOT platform: ",myData)
    time.sleep(10)
client.disconnect()

```

## 8. TESTING

Software testing is the process of evaluating and verifying that a software product or application does what it is supposed to do. The benefits of testing include preventing bugs, reducing development costs and improving performance.

## 8.1 TEST CASES

A test case is a singular set of actions or instructions for a tester to perform that validates a specific aspect of a product or application functionality. If the test fails, the result might be a software defect that the organization can triage.

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result	Status	Executed By
connect the output values to the cloud services by using NODE RED_TC_02	Functional	Backend	Connecting the python code with the node red by providing the watson credentials	IBM IOT Watson platform and Node-RED	1.Provide the watson credentials in the python script 2.Verify the values are displayed in node red 3.Values must be obtained in watson,Node-red and python	Latitude=" " " Longitude=" " "	Latitude and longitude values obtained	Working as expected	Pass	I.Stephen Heart,E.Dhamaraj
Make the data's store in IBM cloudant database_TC_01	Functional	Storage	Creating the cloudant DB in IBM cloud services to store the parameter values.	IBM Cloudant DB	1.Create the cloudant dB in IBM cloud services 2.Connect the Cloudant node to the design flow 3.Open cloudant and check whether the values are stored.	Latitude=" " " Longitude=" " "	The parameters values must be stored in the cloudant DB.	Not working as expected	Fail	I.Stephen Heart,E.Dhamaraj
Make the data's store in IBM cloudant database_TC_02	Functional	Storage	Creating the cloudant DB in IBM cloud services to store the parameter values.	IBM Cloudant DB	1.Create the cloudant dB in IBM cloud services 2.Connect the Cloudant node to the design flow 3.Open cloudant and check whether the values are stored	Latitude=" " " Longitude=" " "	The parameters values must be stored in the cloudant DB.	Working as expected	Pass	R.MadhanDeepak, V.C.Praveen
Alerts has to be sent to the authorities _TC_01	UI	Display	Making the alert messages reach the authorities with the parameter values.	Messaging Tool	1.Sign in with messaging platforms like Fast 2 SMS. 2.Connect the values and provide the threshold values. 3.Provide contact numbers or mail id. 4. Check for the alert messages	Alert!!! The child is out of geofence	The alert messages must be sent to the authorities with the exact values.	Not working as expected	Fail	R.MadhanDeepak,V.C.Praveen,I.Stephen Heart,E.Dhamaraj
Alerts has to be sent to the authorities _TC_02	UI	Display	Making the alert messages reach the authorities with the parameter values.	Messaging Tool	1.Sign in with messaging platforms like Fast 2 SMS. 2.Connect the values and provide the threshold values. 3.Provide contact numbers or mail id. 4. Check for the alert messages	Alert!!! The child is out of geofence	The alert messages must be sent to the authorities with the exact values.	Working as expected	Pass	R.MadhanDeepak, V.C.Praveen,I.Stephen Heart,E.Dhamaraj
Final Report Output_TC_01	UI	Output	The entire project is simulated and the outputs are recorded.	Project doc	1.The entire output can be obtained. 2.Final report is prepared with the suggested format	Latitude=" " " Longitude=" " "	The entire system must work accordingly.	Working as expected	Pass	R.MadhanDeepak, V.C.Praveen,I.Stephen Heart,E.Dhamaraj

UAT Test case Link:

[test case.xlsx](#)

## 8.2 USER ACCEPTANCE TESTING

User Acceptance Testing (UAT), also known as beta or end-user testing, is defined as testing the software by the user or client to determine whether it can be accepted or not. This is the final testing performed once the functional, system and regression testing are completed

### 1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the Child Safety Monitoring project at the time of the release to User Acceptance Testing (UAT).

## 2. Defect Analysis

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	6	2	2	3	12
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	14	32
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8
Totals	20	12	13	20	65

## Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Test cases	Not Tested	Fail	Pass
Designing the circuit	1	0	0	1
Getting output using Python	1	0	0	1
Connecting python with Node red and Watson	2	0	1	1
Cloudant DB	2	0	1	1
Alert Message	2	0	1	1
Final Report output	1	0	0	1

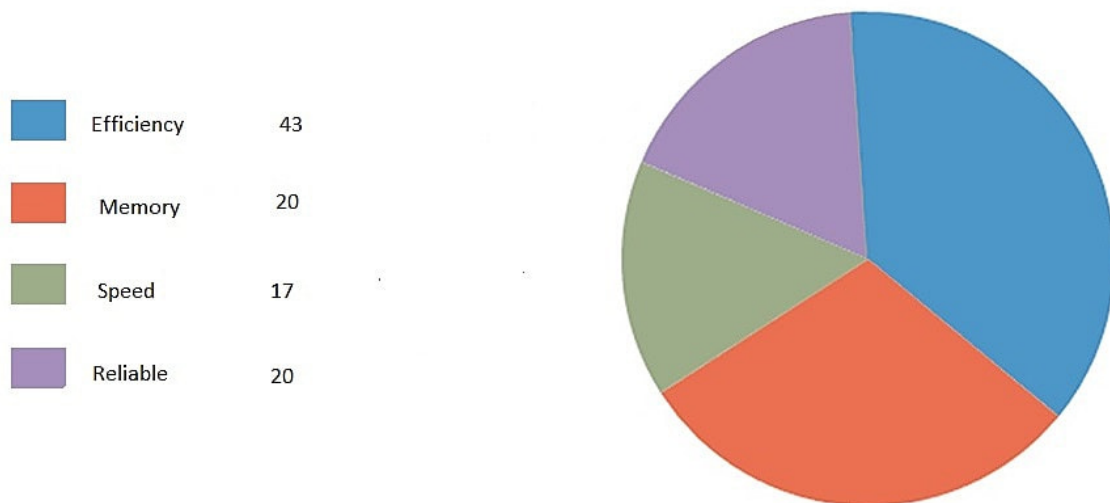


## 9. RESULTS

### 9.1 PERFORMANCE METRIC

The performance and the working of the code is very quick and the results appears in quick succession. Our code is linked with the most used IBM Watson IoT Platform which works with much perfection. This cloud platform is very secure to use and configure easily. As the code is simulated within seconds the result appears. We have done lot of works using this IoT platform which is very simple and good user friendly platform. Below we display our connected IoT platform which delivers the results as the code is run.

#### CHILD SAFETY WEARABLE DEVICE PERFORMANCE



## 10. ADVANTAGES & DISADVANTAGES

### ADVANTAGES:

- Easy Availability& Affordability

Gone are the days when buying a GPS enabled Wearable Device for kids was considered a luxury. Today, however, the scenario is different. There are plenty of options readily available. It is easy to buy a smart watch for kids of your choice online. What's more, these magnificent tech gadgets don't burn a big hole in your pockets and make up for an affordable buy. Now a smart watch is just a click away! Besides, these smart-watches lend a style statement to your fashionconscious kids.

- Tracking Made Easy

Fueled by IOT, the GPS enabled Wearable Device act as a saviour for parents who are always clouded with worries about their kids. Tracking a child was never this easy. These Wearable Device allow parents to track their children in crowded/public places or when they are out of sight say at school, picnic or an outing. Parents can use these smart-watches to track the location of their lost kids.

- Smart watch is Technology in Disguise

No matter how tech advanced the smart watches are, they hardly look like one. Most manufacturers have worked hard to mold their tech wonders in a time piece that looks everything but a tech piece! Their childish designs and bright colour combination is perfect to disguise them. This is precisely why most people can hardly spot the difference between a smart watch and an ordinary watch. Good for kids whose use them, as their adorable designs keep these watches safe from the prying eyes.

### i. Watches Over Your Kids

GPS tracker watches are a boon for parents as they help in watching over your kids when either they are away or you are away from them. These devices:

Tracks kids when they reach school or arrive home from school.

Track kids when they are untraceable in a crowded space.

Track kids when they are away from home and out of your sight.

### Guarantees Peace of Mind to Parents

Parents, whether at home or office, are always worried about the safety of their kids. The fear of losing your child to avoidable circumstances is the concern area for all mommies and daddies. On the other hand, a smart watch equipped kid is always traceable and reachable in case of contingencies and emergencies. This in fact, offers great solace for parents, who are relieved at the thought of maintaining an uninterrupted connectivity with their children, anytime, anywhere. Enough to of course, guarantee the much-needed peace of mind

### **DISADVANTAGES:**

Daily battery charging may be difficult to remember for the wearable trackers. Frequent monitoring of child location notification is difficult. Children may lose the gadget.

## 11. CONCLUSION

The Implementation of Activity tracker system using IOT safeguards the children and it can also be effectively used for women, elderly people to protect them and safeguard in the fastest way which is possible automatically. This system mainly focuses on a wireless method which will alert and communicate with secure medium and can perform the real time monitoring of particular zone and detect the safety with efficient accuracy. This idea can be implemented in different areas of security around the school zones, institutions, shopping zones where facing perilous situations happens because of attacks. This system would be highly

sensitive and easy to handle. Its quick action response will provide better rescue to every individual user. The Activity tracker can be used for the elderly ill people, physically challenged and children in a better way fixed with real time cameras for more precision based results and real time accuracy.

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.

Throughout the research, it is clearly explained the IoT concept, child safety issues and the need of using child security system. Some previous studies have been included for designing the IoT-based child security smart band. It assists parents to monitor their children remotely. In case situations happen, notifications will be sent to parents so that actions can be taken. Through this, child safety can be ensured and crime rate will be reduced. However, the proposed device is not robust enough and does not contain sufficient functions to operate like a mobile phone. Hence, the future enhancements will be adding more features, software, applications, hardware to make the proposed system capable of working more intelligently, meanwhile guarantee the safety of children.

## **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 live 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.

This research demonstrates Smart IoT device for child safety and tracking helping the parents to locate and monitor their children. If any abnormal values are read by the sensor then an SMS is sent to the parents mobile and an MMS indicating an image captured by the serial camera is also sent. The future scope of the work is to implement the IoT device which ensures the complete solution for child safety problems.

Nowadays, crime rates, particularly kidnappings of children, are on the rise. Furthermore, it is not always feasible to be there with them because most parents must work to support their families. The suggested approach has the potential to minimize the number of child missing instances. This system provides a tracking tool for parents to track their child's whereabouts outside utilizing WFPS, allowing them to know the exact location of the youngster. Furthermore, contribute to preventing this tragedy from recurring in the future.

### **13. APPENDIX**

#### **SOURCE CODE**

```
import json
import wiotp.sdk.device
import time

myconfig = {
    "identity": {
        "orgId": "0rfzob",
        "typeId": "NODEREDMCU12",
        "deviceId": "987654321"
    },

```

```

    "auth": {
        "token": "0987654321"
    }
}

client = wiotp.sdk.device.DeviceClient(config=myconfig, logHandlers=None)
client.connect()

while True:
    name= "India"
    #in area location

    latitude= 10.929289384268262
    longitude= 78.74765032731429

    #out area location

    #latitude= 17.4219272
    #longitude= 78.5488783
    myData={'name': name, 'lat':latitude, 'lon':longitude}
    client.publishEvent(eventId="status", msgFormat="json", data= myData,
qos=0),#onpublish=None
    print("Data published to IBM IOT platform: ",myData)
    time.sleep(10)

```

```

client.disconnect()

import json
import wiotp.sdk.device
import time

myconfig = {
    "identity": {
        "orgId": "0rfzob",
        "typeId": "NODEREDMCU12",
        "deviceId": "987654321"
    },
    "auth": {
        "token": "0987654321"
    }
}

client = wiotp.sdk.device.DeviceClient(config=myconfig, logHandlers=None)
client.connect()

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    name= "India"
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    longitude= 78.74765032731429

```

```
#out area location
#latitude= 17.4219272
#longitude= 78.5488783
myData={'name': name, 'lat':latitude, 'lon':longitude}
    client.publishEvent(eventId="status", msgFormat="json", data= myData,
qos=0),#onpublish=None
    print("Data published to IBM IOT platform: ",myData)
    time.sleep(10)

client.disconnect()
```

## **GITHUB & PROJECT DEMOLINK**

<https://github.com/IBM-EPBL/IBM-Project-30209-1660141819>

<https://clipchamp.com/watch/5VmaX2SrQCt>