

Title	Project Report
Team ID	PNT2022TMID19355
Project Name	Project - IOT Based Safety Gadget For Child Safety Monitoring & Notification
Date	19.11.2022

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## **1. Introduction:**

### **1.1 Project Overview**

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**

It offers a solution to aid parents in monitoring their children. It's a child monitoring device that can track a child's whereabouts as well as allow parents to set up a virtual fence or safe zone for their children. All parents must agree that child monitoring is preventive.

## **2. Literature Survey:**

### **2.1 Existing Problem**

Before the initiative, there was no online service for tracking of children. It was also observed that due to unavailability of data of missing children in the right time, they were trafficked or not reintegrated with their family in a reasonable time. Also the process of reintegration becomes lengthy. The citizens were also unable to contact with various child protection authorities for missing and sighted cases. The monitoring of child was also a complex process for child protection authorities.

### **2.2 Reference**

- **My Kid: An Android Based Child Tracking System.**  
Kumar, M. T., Ravi, A. P., Balachandran, A., Reshma, K. C., & Suresh  
<https://www.semanticscholar.org/paper/My-Kid-%3A-An-Android-Based-Child-Tracking-System-Kumar-Ravi/e2f35923b509e2bc5383d6a97f2f78561e2e8cd4>
- **Child tracking system**  
Lee, Chun Hong  
<https://www.coursehero.com/file/102256764/SE-2016-1302808-1pdf/>
- **A Smart Security for Child Safety**  
Soundarya, P., M. Nivetha Kumari, and J. Jayachitra  
<http://www.ifet.ac.in/child-safety.php>

### **2.3 Problem Statement Definition**

#### **1) Increasing rate of child kidnapping**

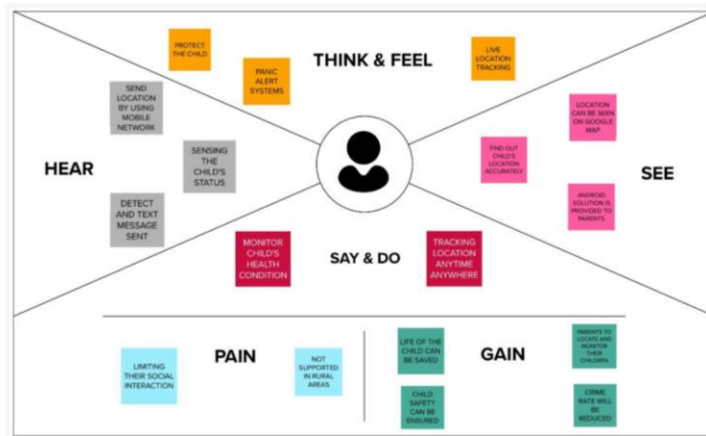
According to News Strait Times Newspaper, of the 567 children, another 193 children are still missing and being investigated. A majority of cases were due to family problems, seeking freedom and running off with lovers or friends. (Bukit Aman CID (Investigations and Legal) deputy director Datuk Law Hong Soon, June 4, 2016)

#### **2) Lack of tracking technology for child**

The parent is hardly to keep a watch on their child without the use of technology, especially when the child is in the outdoor. The parent even cannot avoid the negligence that will make by children in the future day.

### 3.Ideation & Proposed Solution

#### 3.1.Empathy Map Canvas

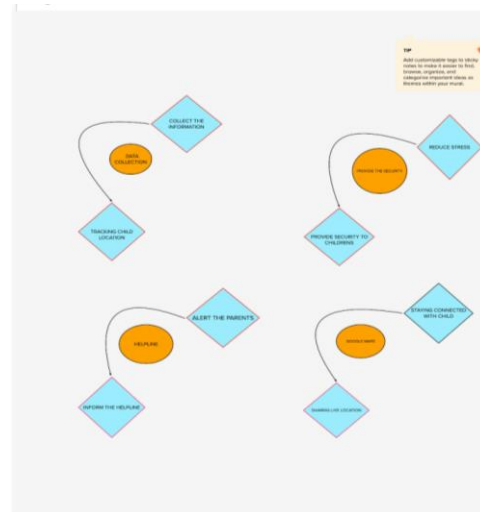


#### 3.2.Ideation and Brainstorming

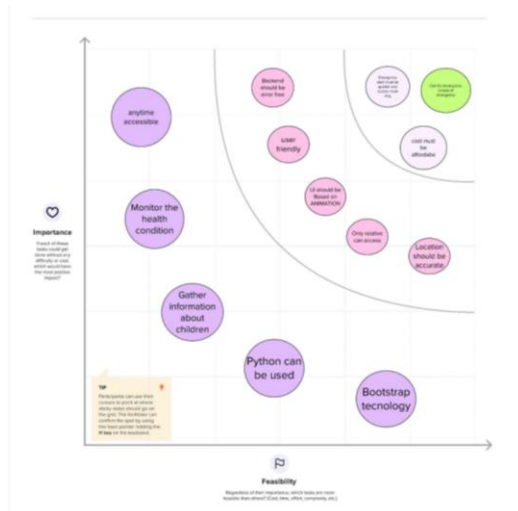
Step-1: Team Gathering, Collaboration and Select the Problem Statement



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



### Step-3: Idea Prioritization



### 3.3.Proposed Solution

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)-----	Around the world, many children disappear each year and are not found. Runaways, parental abductions or kidnappings by others, these acts are difficult to prevent and have dire consequences on the children involved. Nowadays, crime rate associated with children keeps increasing due to which draws people attention regarding child safety.
2.	Idea / Solution description	The users are required to register using their credentials to use the application. The device will be given to the children for monitoring them regularly. We will feed the boundary value while writing code for the system and we control it using GPS for that device which is also known as Geo Fencing. These data are stored in the server.
3.	Novelty / Uniqueness	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.

4.	Social Impact / Customer Satisfaction	<ul style="list-style-type: none"> <li>• A tracking device can be useful in the case when the parent feels that his or her child is in danger. This device provides real-time location.</li> <li>• These kinds of devices also help parents to set a parameter for their children when they leave the house. Whenever the child steps beyond a defined area, the tracking system will alert the parent.</li> <li>• The idea of the system is to restrict the child's freedom but to know how far the child has gone.</li> </ul>
5.	Business Model (Revenue Model)	<ul style="list-style-type: none"> <li>• The innovative business model involves sponsors and partners who share their commitment to edutainment to kids. The two key factors are architectural design and business concept development by involving edutainment activities.</li> </ul>
6.	Scalability of the Solution	<ul style="list-style-type: none"> <li>• In our system, we automatically monitor the child in real time using Internet of Things. 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.</li> </ul>



### 3.4.Problem Solution Fit

Define CS, fit into CC	<b>CUSTOMER SEGMENTS</b> <b>CS</b>	<b>CUSTOMER LIMITATION</b> <b>CC</b>	<b>AVAILABLE SOLUTION</b> <b>AS</b>	Explore AS
	This helps the parents to track the daily activity of children and helps to find the child using GPS location.	It is fully about safety and secured electronic system for child . Less tension to Parents.	In Previous method, the model created which can be capable of handling the battery for long time. Nowadays, the system proposes a location tracking facilities and speeding monitoring using GPS, GSM with IOT technology for child safety at low cost which can be affordable by the people.	
Understand RC	<b>PROBLEMS/PAINS</b> <b>PR</b>	<b>PROBLEM ROOT/CAUSE</b> <b>RC</b>	<b>BEHAVIOUR</b> <b>BE</b>	Understand RC
	The child safety is a complex far reaching health priority, which requires holistics ways of identifying safety issues.	It fears frustration obstacles and understanding the working of the system. Due to this solution, the kidnapping rate will be decreased.	It mainly focus on improving parent-child interactions, home safety and child health care as well as monitoring.	
Identify strong TR & EM	<b>TRIGGERS TO ACT</b> <b>TR</b>	<b>YOUR SOLUTION</b> <b>SL</b>	<b>CHANNELS OF BEHAVIOUR</b> <b>CH</b>	Extract online & offline CH of BE
	<b>EMOTIONS</b> <b>EM</b>	The parents can monitor their child each and every second. If the child is in danger, they notified by SMS through their device and their parents can save them.	Children and their parents are turning to digital solutions more than ever to support children's learning.	
	Due to this, the emotional and mental stability of the children gets affected which in turn ruins their career and future.		While digital solutions provide huge opportunities for sustaining and promoting children's right	

## 4.Requirement Analysis

### 4.1.Functional Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	<ul style="list-style-type: none"><li>● Registration through Gmail</li><li>● Registration through phone number</li></ul>
FR-2	User Confirmation	<ul style="list-style-type: none"><li>● Confirmation viaEmail</li><li>● Confirmation via OTP</li></ul>
FR-3	App installation	<ul style="list-style-type: none"><li>● Installation through link</li><li>● Installation through play store</li></ul>
FR-4	Settings geofence	<ul style="list-style-type: none"><li>● Setting by user to find childlocation</li></ul>
FR-5	Detecting childlocation	<ul style="list-style-type: none"><li>● Detecting location via app</li><li>● Detecting location via SMS</li></ul>
FR-6	User Interface	<ul style="list-style-type: none"><li>● User Login Form.</li><li>● Admin Login Form.</li></ul>
FR-7	Database	<ul style="list-style-type: none"><li>● Stored in cloud for seamlessconnectivity.</li><li>● Parents and kids link with the distance and the location values obtained from the mobiledevices are stored here.</li><li>● The valuesinclude parent id, kidid, distance, longitude, latitude etc.</li></ul>
FR-8	Server	<ul style="list-style-type: none"><li>● It connects the database and the frontend application.The backend server has beenimplementedto run as a service and is deployed in an IBM cloudinstance.</li><li>● The backend server has beenimplemented to run as a service and is deployed in an IBM cloudinstance.</li></ul>

FR-9	GPS tracking	<ul style="list-style-type: none"> <li>● The system is implemented with a GPS module, which acquires the location information of the user and stores it to the database.</li> </ul>
FR-10	API	<ul style="list-style-type: none"> <li>● The value collected is sent to the database using an API.</li> </ul>
FR-11	React JS	<ul style="list-style-type: none"> <li>● We are using react as front end for our project.</li> <li>● Node JS for the back end we are using node.js.</li> </ul>
FR-12	GPS modules	<ul style="list-style-type: none"> <li>● It receives data directly from satellites.</li> </ul>
FR-13	Battery Life	<ul style="list-style-type: none"> <li>● If 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.</li> <li>● It should be long-lasting.</li> </ul>
FR-14	Location History	<ul style="list-style-type: none"> <li>● The location history will help to track the child's activity so that they won't be updated. Location history will be there for 30 days.</li> <li>● For example if the child gets missing with the help of location history they can track down their child's activity and also can find their child.</li> </ul>

#### 4.2.Non-Functional Requirement

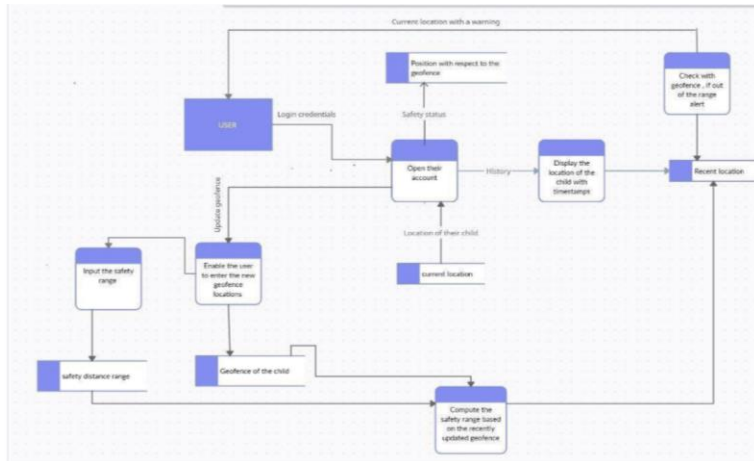
Following are the non-functional requirements of the proposed solution.

NFR NO	Non-functional Requirements	DESCRIPTION
NFR-1	Usability	<ul style="list-style-type: none"><li>● Device have GSM can help to inform the parents or relatives about the current situations of the childby deliver the message immediately to save the child.</li></ul>
NFR-2	Security	<ul style="list-style-type: none"><li>● Make children parents more assure about their kid's security, we have a feature in our devicecalled Geo-Fence.</li><li>● Whenever your child crossesthat specific area, you will get an instant notification on your phone.</li></ul>
NFR-3	Reliability	<ul style="list-style-type: none"><li>● Portable</li><li>● Easy to use</li><li>● Flexibility</li></ul>
NFR-4	Performance	<ul style="list-style-type: none"><li>● Create a Child tracker which helps the parents with continuously monitoring the child's location.</li><li>● The notification will be sent accordingto the child's location to their parents or caretakers.</li><li>● The entire location data will be stored in thedatabase.</li></ul>
NFR-5	Availability	<ul style="list-style-type: none"><li>● Track yourchild even in a crowd</li><li>● Get traveldetails of kidsat any time</li><li>● Know thecurrent location</li></ul>

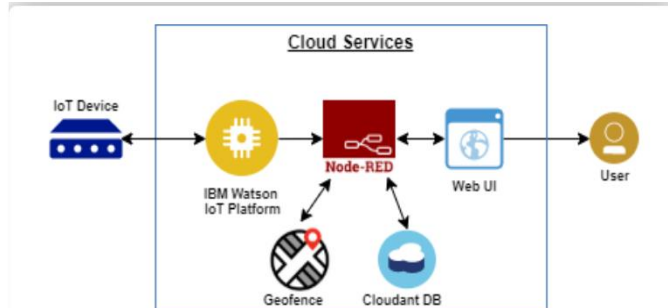
NFR-6	Scalability	<ul style="list-style-type: none"> <li>● Gadget ensures the safety and tracking of the children.</li> <li>● Parents need not worry about their children.</li> </ul>
NFR-7	Evaluability	<ul style="list-style-type: none"> <li>● The system should be able to deliver promptly to the financing authority.</li> <li>● In the case of non-profit organizations, the solution should be 'advancing the mission'.</li> </ul>
NFR-8	Dynamicity	<ul style="list-style-type: none"> <li>● IoT devices may have the capability to adapt dynamically and change based on their conditions.</li> </ul>
NFR-9	Desirability	<ul style="list-style-type: none"> <li>● Navigation should be made easy.</li> <li>● The user should be able to search and find the information he needs without much hassle.</li> </ul>

## 5. Project Design

### 5.1 Data Flow Diagrams



### 5.2 Solution & Technical Architecture



### 5.3 User Diaries

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user) and (Web user)	Device configuration	USN-1	Creating a device using IBM Watson platform	I can access my account / dashboard	High	Sprint-1
		USN-2	The IOT Watson platform Is being connected to IOT cloud for purpose of data Sharing..	I can receive confirmation Email & click confirm	High	Sprint-1
	Cloudant Database	USN-3	A Database to store the location on cloudant DB to get in on time information the child.	I can register & access the dashboard with google account Login	High	Sprint-2
	Node Red configuration	USN-4	As a developer, coding is the necessary part for running of any device involving IOT kits.		High	Sprint-2
	Dashboard					
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
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## 6.PROJECT PLANNING & SCHEDULING

### 6.1 Sprint Planning & Estimation

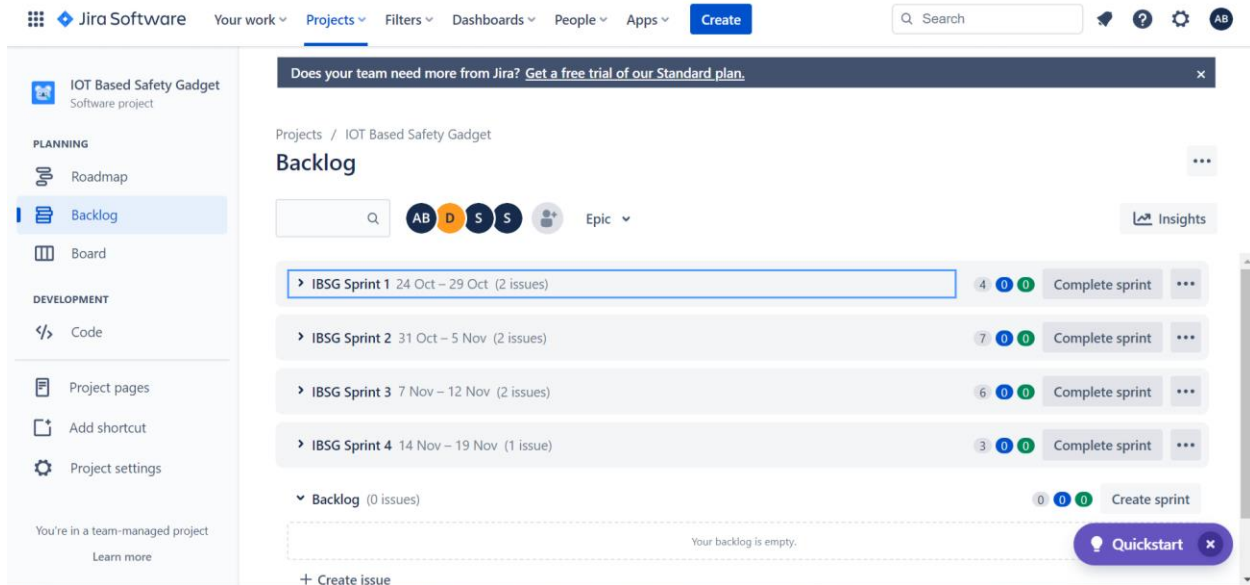
Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Point	Priority	Team Members
Sprint-1	Device configuration	USN-1	Creating a device using IBM Watson platform	1	High	Akshayapriya B.S
Sprint-1		USN-2	The IOT Watson platform Is being connected to IOT cloud for purpose of data Sharing..	3	High	Akshayapriya B.S
Sprint-2	Cloudant Database	USN-3	A Database to store the location on cloudant DB to get in on time information the child.	4	High	Dhanapriya R
Sprint-2	Node Red configuration	USN-4	A Node application is being used for connection of the devices to get analysis of performance	3	High	Dhanapriya R
Sprint-3	Coding for establishment	USN-5	As a developer, coding is the necessary part for running of any device involving IOT kits.	2	Medium	Somnath Gorai P
Sprint-3		USN-6	It is being used for backend running of process in IOT Watson platform	4	High	Somnath Gorai P
Sprint-4	Alerts	USN-7	The user can get lots of notification options, GPS tracker, alarm in case of emergency.	3	High	Sowmisankari M

## 6.2 Sprint Delivery Schedule

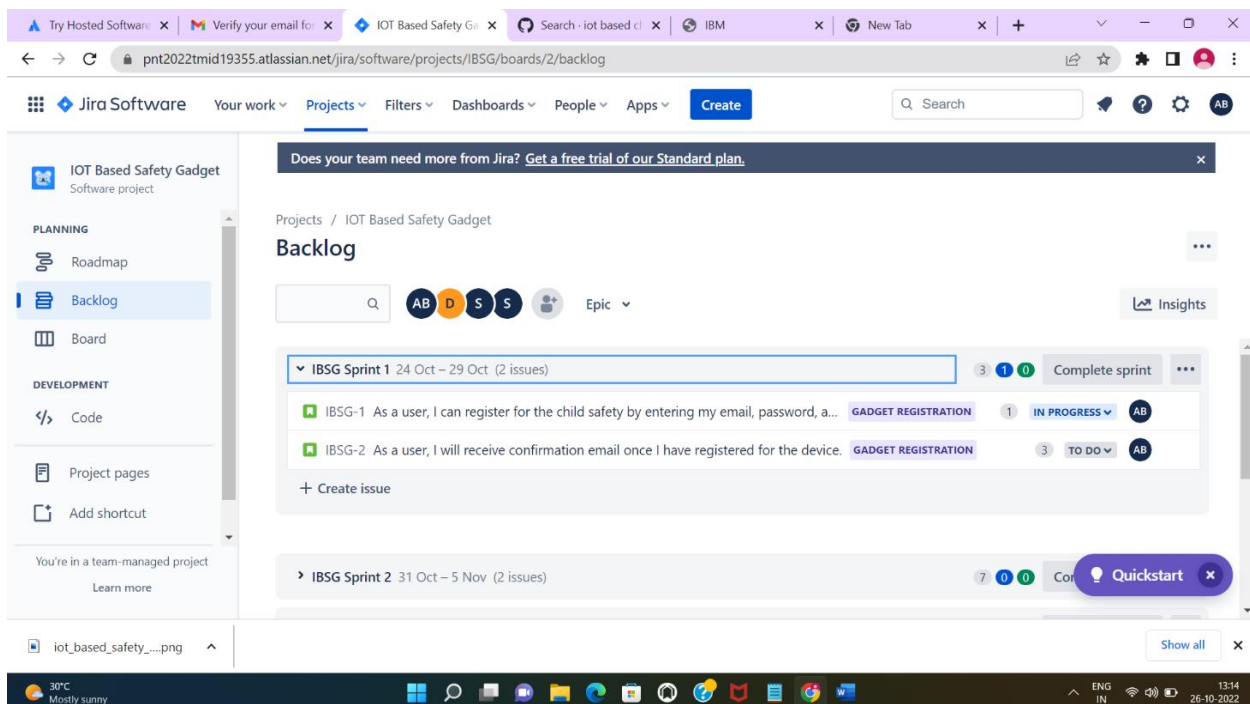
Sprint	Total Story Points	Duration	Sprint StartDate	Sprint End Date(Planned)	Story Points Completed (as on PlannedEnd Date)	Sprint Release Date(Actual)
Sprint-1	4	6 Days	24 Oct 2022	29 Oct 2022	4	29 Oct 2022
Sprint-2	7	6 Days	31 Oct2022	05 Nov2022	7	05 Nov2022
Sprint-3	6	6 Days	07 Nov2022	12 Nov2022	6	12 Nov2022
Sprint-4	3	6 Days	14 Nov 2022	19 Nov 2022	3	19 Nov 2022

## 6.3.Reports from JIRA

1. Image showing the Backlogs created in the Jira Software(PETA Spring1,PETA Spring2, PETA Spring3, PETA Spring4)



2. Image showing the User Stories in the respective sprints



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- Code
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## Backlog

Q AB D S S Epic ▾ Insights

IBSG Sprint 2 31 Oct – 5 Nov (2 issues) 7 0 0 Complete sprint

- IBSG-3 As a user, I can register for the taking care of child tracking location. GADGET REGISTRATION 4 TO DO ▾ D
- IBSG-7 As a user, I can log into the application by entering mobile no & password. LOGIN BY USER 3 TO DO ▾ D

+ Create issue

Quickstart

iot\_based\_safety\_....png

30°C Mostly sunny

ENG IN 13:14 26-10-2022

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Projects / IOT Based Safety Gadget

## Backlog

Q AB D S S Epic ▾ Insights

IBSG Sprint 3 7 Nov – 12 Nov (2 issues) 6 0 0 Complete sprint

- IBSG-4 As a user, I can track the child if the child is missing through the device. DASHBOARD 4 TO DO ▾ S
- IBSG-5 As a user, I can log into the application by entering email & password. LOGIN BY USER 2 TO DO ▾ S

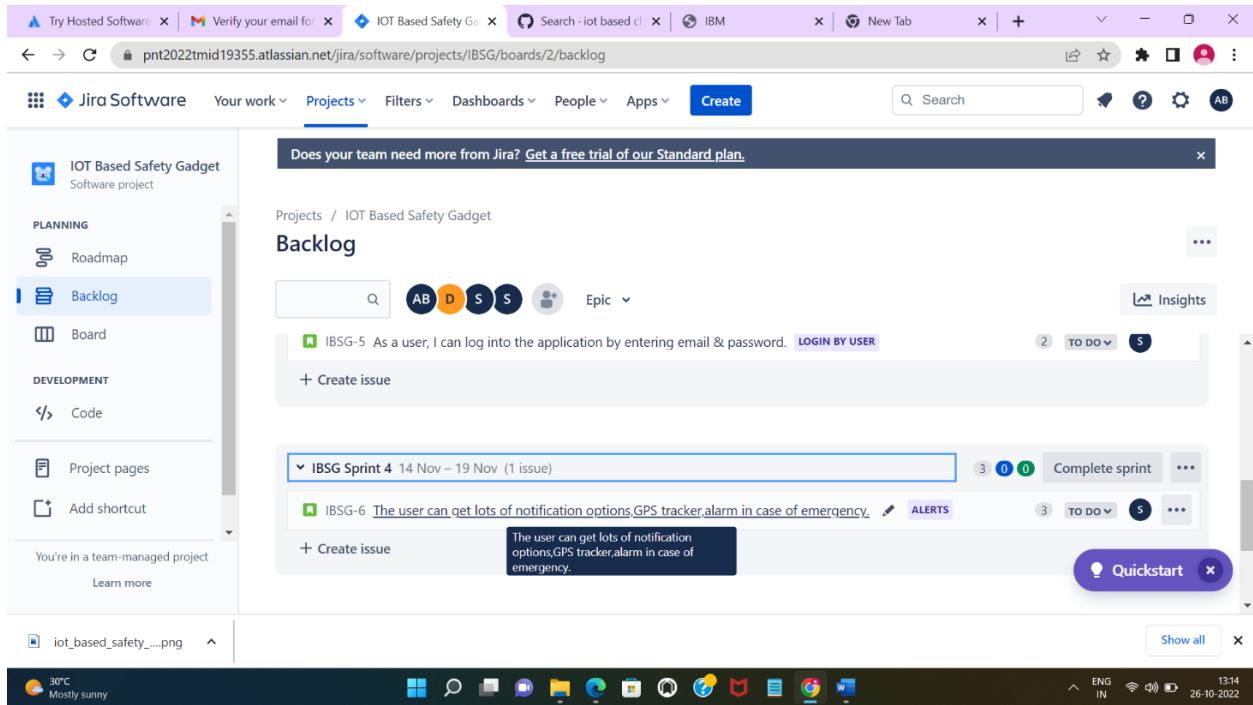
+ Create issue

Quickstart

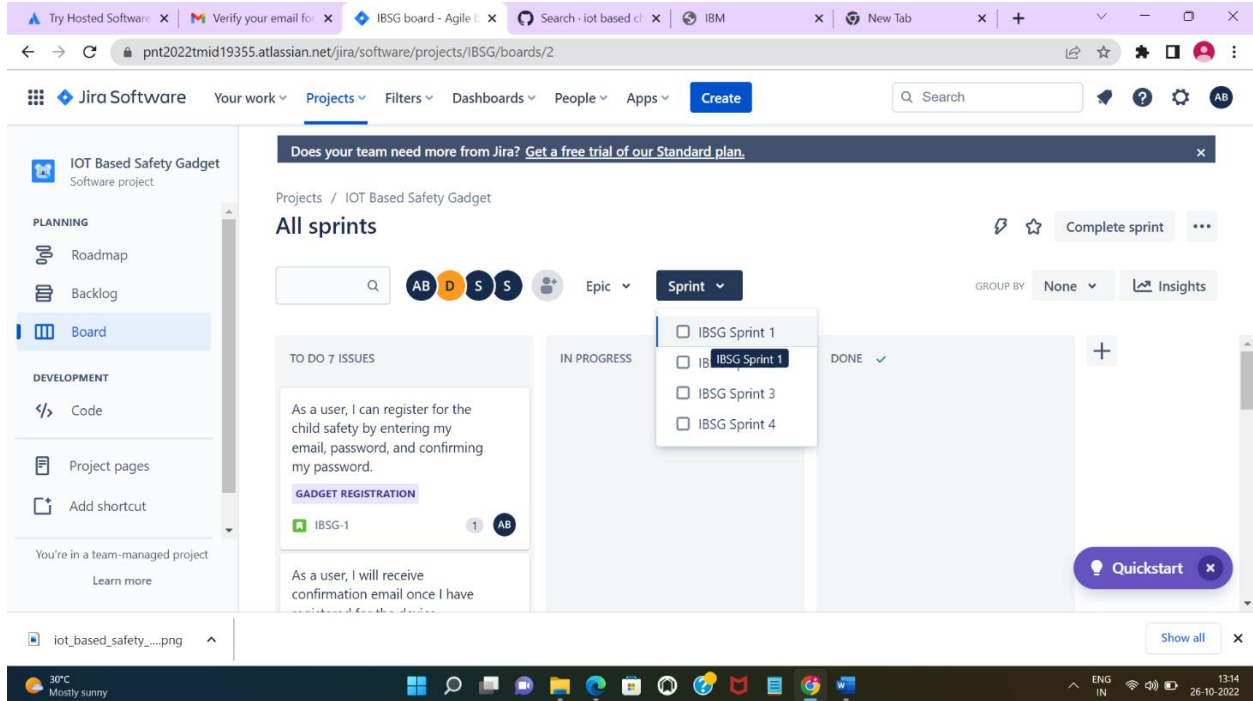
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30°C Mostly sunny

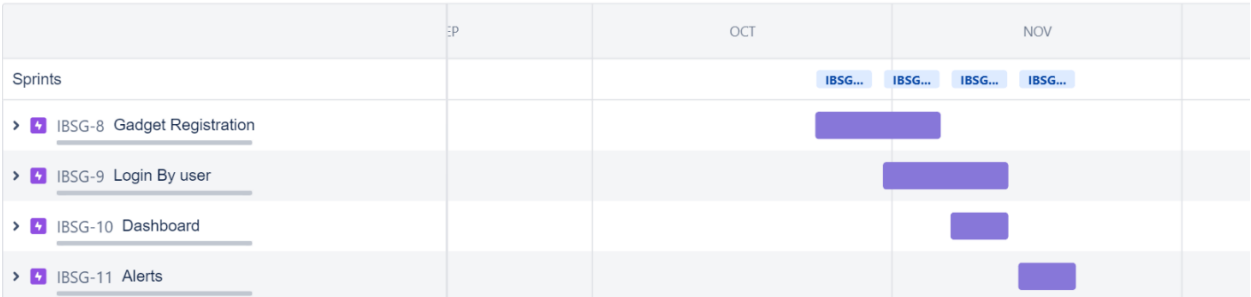
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### 3. Image showing the working progress of the Sprint



4.Image showing the Roadmap of the Sprints



## 7. CODING & SOLUTIONING

### 7.1. Feature

```
import json
import wiotp.sdk.device
import time
myConfig = {
    "identity":{
        "orgId": "jqjdz3",
        "typeId": "childsafety01",
        "deviceId": "Device01"
    },
    "auth": {
        "token": "12345678"
    }
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
while True:
    name= "Smartbridge"
    latitude = 17.4225176
    longitude = 78.5458842
    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 platfrom: ", myData)
    time.sleep (5)
    client.disconnect()
```

## 8. TESTING

### 8.1. Test Cases

Testcases Report Template - Excel

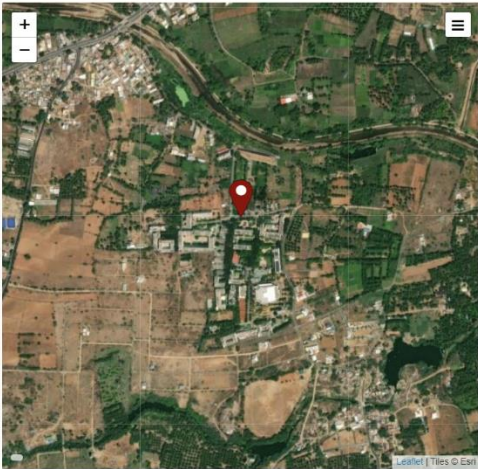
akshaya priya

Test case ID	Feature Type	Component	Test Scenario	Pre-Requisite	Steps To Execute	Test Data	Expected Result	Actual Result
Python code_TC_001	Functional	Python	Testing the GPS boundary within in the boundary location		1.Run the python coding 2.Observing the result		No alert send to the user	Wor exp
Python code_TC_002	Functional	Python	Tracking the location outside of the boundary		1.Run the python coding2.Observing the result		Alert and popup message sedn to the user immediately	Wor exp
Database_TC_003	Functional	Database	Storing the current location of child		1.Run the python coding2.Observing the result		Data stored in a database	Wor exp

### 8.2. User Acceptance Testing

child safety

Home



29°C Haze



## **9. RESULTS**

### **9.1. Performance Metrics**

We have a web camera through which we can monitor the child lively through live video streaming whenever we get notified when they cross the geo fence. We have an IP address in our mobile application or web application through which we can monitor what's happening around the child. We can monitor the child 24/7 in real time through the help of this gadget which makes parents feel that they are beside their children ensuring children's safety.

## **10. ADVANTAGES**

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

## **DISADVANTAGES**

- Kids may become more secretive. Young people may respond to being tracked by becoming increasingly secretive and flouting the surveillance by, for example, leaving their phone at a friend's house so their parents think they're there.
- They don't become streetwise
- Internet and social media access
- Trust issues

## **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 abusements, 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 - <https://github.com/IBM-EPBL/IBM-Project-31881-1660205824>