# IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

**NALAIYA THIRAN PROJECT BASED LEARNING**

**On**

**PROFESSIONAL READINESS FOR INNOVATION, EMPLOYABILITY AND ENTREPRENEURSHIP**

*Project Report Submitted by*

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# 1. INTRODUCTION

## Project Overview:

It is observed that more families are now spending time on work and social duties, resulting in a lack of interaction with their children. This causes increased concerns towards their safety and whereabouts which has made keeping a track of their activities quite challenging. Also, crimes against children are increasing rapidly around the world. According to a study, roughly 60,000 children go missing in India every year [1]. There is an assumption that every 10 minutes, a child goes missing. Cities like Mumbai and Delhi have the highest rate when compared to other metro cities. With the lack of availability of affordable child monitoring systems, it is hard to monitor the whereabouts of children. The safety of children is very critical since they cannot protect themselves.

## Purpose:

A momentary lack of parental supervision should be combated with an appropriate IT solution in context. Therefore, the proposed system must alert the parents when the child walks too far away and/or outside the "circle of safety" in their absence. The solutions that are available in the market today are not able to address all the issues in one device. There are a few ways that the existing solutions work. First, with the use of a Smartphone. This method might seem handy, but providing a young child with a Smartphone in hand is not an ideal case, counter to the monetary investment for the phone, and the additional responsibility that the child has to take to handle and take care of the phone. This makes it a less feasible solution. The other way is via smartwatches that a child wears on the wrist. This may seem like an ideal solution, but the problem with this arises when the kidnapper is aware of such a device, and immediately

removes the device from the child's wrist and destroys it. With the proposed solution, we make a discreet-looking device that doesn't look like a tracking device but is always with the child. Because of the way it looks, it does not distract the child, and with its small size, it can be easily attached to any part of the child's clothing.

# 2. LITERATURE SURVEY

## 2.1. Existing Systems:

Some of the systems that have been implemented to make the IoT based Children Monitoring System in School used as literature survey.

**IOT Based Smart GPS Device for Child and Women Safety Applications**

"Android based solution to aid parents to track their children in real time. Different devices are connected with a single device through channels of internet. The concerned device is connected to server via internet. The device can be used by parents to track their children in real time or for women safety. The proposed solution takes the advantage of the location services provided by GSM. It allows the parents to get their child's location on real time by SMS.This device will also have the facility of Emergency help key (SOS), if anyone presses the key, automatic help message will be sentto 3 registered mobile numbers on Server." [1]

**Children Tracking System using ARM7 on Android Mobile Terminals**

"The proposed system includes a child module and two receiver modules for getting the information about the missed child on periodical basis. The child module includes ARM7 microcontroller (l pc  2378),  Global  positioning system (GPS), Global system for mobile communication (GSM), Voice playback circuit and the receiver module includes Android mobile device in parent's hand and the other as monitoring database in control room of the school."[2]

**Crossbow Motes technology**

"Crossbow Motes are very small devices that contain a microprocessor,

radio transceiver, and interfaces to connect simple sensors such as smoke, temperature. The Crossbow Motes device; these Motes are a new and quickly-growing technology. But there are some disadvantages to use these devices such as: Finite Coverage, affected by trees & walls High cost." [3]

**Gotcha® System**

"Gotcha it is child monitor that helps parents to protect their children at malls, supermarkets, parks, or everywhere. Gotcha alerts the children and parent whenever they wonder farther than a safe distance. Gotcha is an invisible electronic leash between parents and their kids." [4]

**Global Positioning System (GPS) Technology**

"GPS is a lightweight device that attaches to the child and is designed to help parents or guardians keep track of their children and prevent this kind of tragedy. The device alleviates the stress and panic that appear when children get lost, or are difficult to reach. It emits a series of loud beeps, allowing parents to find their children quickly and easily. This is also an ideal solution for disabled adults, the elderly and daycare centers." [5].

**2.2 Problem Statement Definition**

More family's spent their time for work and social duties but since Children are gift of GOD they need care of family. The current situation of our country is not comfortable for monitoring children in school. With the absence of child monitoring system it is hard to monitor the where about of children.

The poor performance of family's and school to monitor the children's by Collaboration. The use of manual system to connect family's and there students

most of time teachers or other persons are intermediate between the students and family. In our country families and their children have no direct contact in school when they need to contact their children if the families came to school.

Lack of child monitoring in school affect the child's behavior. Under age children may be premature in the way they act and places to be. Most of human behavior is shaped in childhood stage, in order to get morally acceptable behavior child monitoring system is necessary.

Children are prone to many accidents. Safety of children is very critical since children cannot protect themselves.

# 3. IDEATION & PROPOSED SOLUTION

## Empathy Map Canvas
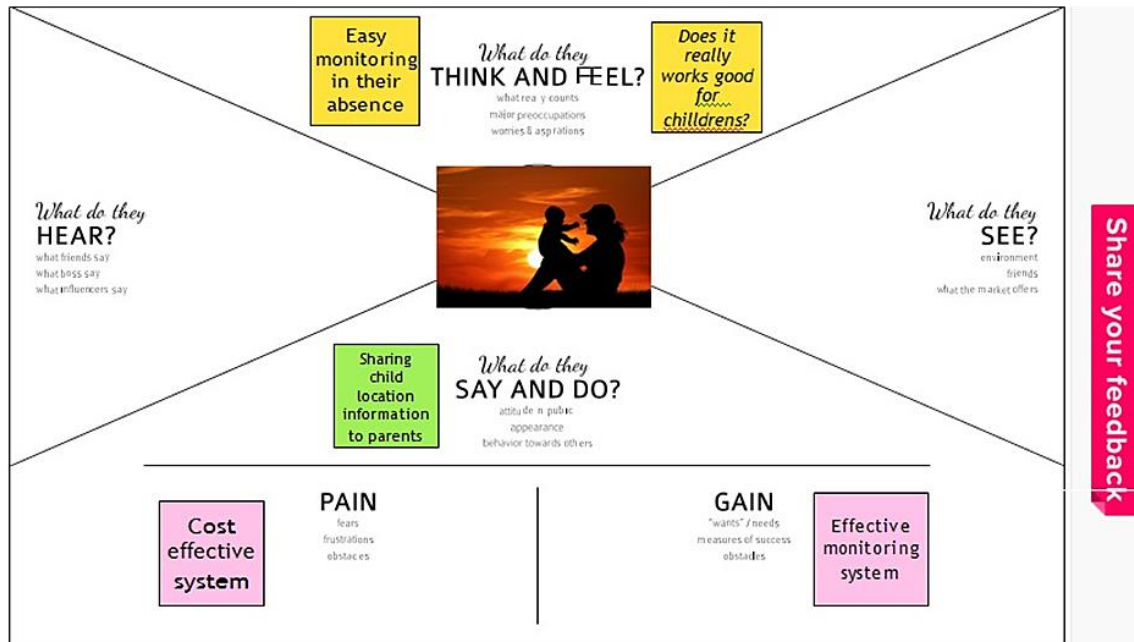


## Ideation & Brainstorming

The proposed model may provide the perfect solution to track child health issues and monitoring that whether they are fully secured or not in their living place. Here we proposed a model to compose all IoT healthcare ideas with the „Temperature, Respiratory and Heart beat" sensing module to provide the best application for providing complete care for children. The child can be even tracked by the parents in remote place. It can be done by monitoring child's blood pressure to check whether it gets crossed the normal or acceptable level of a human body and even the location of the child can be reported if it's out of the school range.

1. Entry and exit of the child

2. Current location of the child

3. Respiration rate of the child

4. Pulse per minute(PPM)

5. Body temperature

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.

The LinkIt ONE board is an open source stage. It comprises of inbuilt Wi-Fi GSM, GPS and Bluetooth modules. Different components such as Temperature sensor, Touch sensor, heartbeat sensor, GSM, GPS modules and serial camera are connected to the LinkIt ONE Board along with built-in GSM, GPS modules. For every 30 minutes except serial camera, the data from GPS, temperature, touch, and pulse rate data is pushed into the cloud. If the values read by the sensor pass a threshold value then an SMS alert is sent to the mobile. The child's parameters of touch, temperature & heartbeat can be plotted on a graph and used for parametric analysis.

For this research, online questionnaire and semi-structured interview are employed. Online questionnaire serves as quantitative research to measure users' attitude, behavior and factors influencing their acceptance towards the child security system. After that, a semi-structured interview is conducted as qualitative research helping in understanding trends, users' preferences, opinions and thoughts about current condition and IoT-based child security

system. Besides, 50 parents nursing one or more children at most 12 years old are participating in this research. The data gathered will be used to prove the severity of current situation and the need to use IoT-based child security system

**Proposed Solution**

| S. No. | Parameter | Description |
|---|---|---|
| 1. | Problem Statement (Problem to be solved) | With the increasing rate of child kidnapping and trafficking and lack of tracking technology for child, there is limited application for child monitoring.<br>Hence an **IoT based safety gadget** for child safety is probably the need of the hour today |
| 2. | Idea / Solution description | A good solution to this issue would be to design a smart wearable Internet of Things sensor based device for monitoring the environment of a child along with a mechanism for tracking the child.<br>The gadget will make use of **GPS and** a python script to publish the location details to the IBM IoT platform.<br>The wearable also functions to send **immediate alerts** to the user through in case if the child crosses the geofence. |
| 3. | Novelty / Uniqueness | All the existing systems make use of GPS and a mobile app to track and receive alerts regarding the child's location, while this system make use of the IBM Watson IOT Platform and IBM Cloud Service whichis reliable and efficient to maintain the database of the child's location. The parent can set geofence and receive alerts through the web application which is user friendly and secure created using the Node Red Service. |

| | | |
|---|---|---|
| 4. | Social Impact / Customer Satisfaction | The main concern of any parent would be the safety and security of their kids. The design of thismodel does not mandate a lot of technical knowledge from the user to operate and it is simple. The purpose of this device is to facilitate the guardian or parents in locating their child with ease and ensuring its well-being. |
| 5. | Business Model (Revenue Model) | The target audience of this device is majorly the parents. Considering the Tracking ability of the device, **Hardware quality, used technology and sensors,** the starting range of price would go from Rs. 6000 and above. This type of wearable safety system is of utmost importance today and would be a must buy gadget in the market today. |
| 6. | Scalability of the Solution | With the present needs for monitoring the child, the system is designed. It has a location database to maintain the entire location history of the child and the parent can set the geofence to determine the safer boundary of the child. If there is a need for integrating additional sensors to improve accuracy, it can be done to make the system efficient in the long run. |

# Problem Solution fit

**Project Title:** IoT based safety gadget for child safety and notification system
**Team ID:** PNT2022TMID47674

<table>
<tr>
<td><strong>Define CS, fit into CC</strong></td>
<td>

**1. CUSTOMER SEGMENT(S)** `CS`

Working parents or busy parents of 0-10 year old kids
</td>
<td>

**6. CUSTOMER CONSTRAINTS** `CC`

Lack of affordable, reliable and hassle free technology, Lack of availability of secure and easy Ui.
</td>
<td>

**5. AVAILABLE SOLUTIONS** `AS`

There are existing solutions that offer location tracking for kids but they are not very efficient, cost effective and reliable all at the same time. This trade off should be addressed.
</td>
<td><strong>Explore AS, differentiate</strong></td>
</tr>
<tr>
<td><strong>Focus on J&P, tap into BE, understand RC</strong></td>
<td>

**2. JOBS-TO-BE-DONE / PROBLEMS** `J&P`

Instantaneous tracking and undation of child's location, geofencing and notifying parents of any abnormalities
</td>
<td>

**9. PROBLEM ROOT CAUSE** `RC`

Customers have to do this to protect their children from potential threats and to ensure the safety while being far away from them.
</td>
<td>

**7. BEHAVIOUR** `BE`

Customers panic, prevent their children from going out on their own, try using easily available technologies
</td>
<td><strong>Focus on J&P, tap into BE, understand RC</strong></td>
</tr>
</table>

<table>
<tr>
<td rowspan="2"><strong>Identify strong TR &EM</strong></td>
<td>

**3. TRIGGERS** `TR`

Coming across news about children being kidnapped and abducted, missing cases being reported.
</td>
<td rowspan="2">

**10. YOUR SOLUTION** `SL`

Building a reliable technology that can address all the customer needs while being reliable and secure ensuring efficient functioning.
</td>
<td rowspan="2">

**8. CHANNELS of BEHAVIOUR** `CH`

**8.1 ONLINE**
Tracking their kids location with their mobile phones' GPS, reading news about child safety and other child missing cases.

**8.2 OFFLINE**
Customers accompany their children to ensure safety, send them together with other reliable people, seek for protection in public places.
</td>
<td rowspan="2"><strong>Identify strong TR &EM</strong></td>
</tr>
<tr>
<td>

**4. EMOTIONS: BEFORE / AFTER** `EM`

Before: Feel insecure, worried, scared and confused.

After: Relieved, calm, confident, happy.
</td>
</tr>
</table>

# 4. REQUIREMENT ANALYSIS

## Functional requirement

Following are the functional requirements of the proposed solution.

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|---|---|---|
| FR-1 | User Registration | Registration through Gmail<br>Registration through phone number |
| FR-2 | User Conformation | Conformation via Email<br>Conformation via OTP |
| FR-3 | App installation | Installation through link Installation through play store |
| FR-4 | Self geophone` | Self by user to find child location |
| FR-5 | Detecting child location | Detecting location via app<br>Detecting location via SMS |
| FR-6 | User Interface | User Login Form. Admin Login Form. |
| FR-7 | Database | Stored in cloud for seamless connectivity. Parents and kids link with the distance and the location values obtained from the mobile devices are stored here. The values include parent id, kid id, distance, longitude, latitude etc. |
| FR-8 | Server | It connects the database and the front end application.<br>The backend server has been implemented to run as a service and is deployed in an IBM cloud instance.<br>The backend server has been implemented to run as a service and is |

| | | deployed in an IBM cloud instance. |
|---|---|---|
| FR-9 | GPS tracking | The system is implemented with a GPS module, which acquires the location information of the user and stores it to the database. |
| FR-10 | API | The value collected is sent to the database using an API. |
| FR-11 | React JS | We are using react js as front end for our project. Node JS for the back end we are using node js. |
| FR-12 | GPS modules | It receives data directly from satellites. |
| FR-13 | Battery Life | 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. It should be long-lasfing. |
| FR-14 | Location History | The locafion history will help to track the child's acfivity so that the aren't will be updated. Locafion history will be there for 30 days. For example if the child gets missing with the help of locafion history the aren't can track down their child's acfivity and also can find their child. |

**Non-Functional requirements**

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

| FR No. | Non-functional Requirements | Description |
|--------|------------------------------|-------------|
| NFR-1 | Usability | Device have GSM can helpto inform the parents or relatives about the current situations of the child by deliver the message immediately to save thechild. |
| NFR-2 | Security | Make children parents more assure about their kid's security, we have a feature in our device called Geo-Fence.<br>Whenever your child crosses that specific area, you will get an instant notification on your phone. |
| NFR-3 | Reliability | Portable Easy touse<br>Flexibility |
| NFR-4 | Performance | Create a Child tracker which helps the parents with continuously monitoringthe child's location.<br>The notification will be sent according to the child's location to their parents or caretakers.<br>The entire location data will be stored in the database. |
| NFR-5 | Availability | Track your child even ina crowd<br>Get travel details of kids at anytime<br>Know the current location |
| NFR-6 | Scalability | Gadget ensures the safety and tracking of thechildren.<br>Parents need not worry about their children. |
| NFR-7 | Value ability | The system should be able to deliver promptly to the enhancing authority.<br>Inthe case of non- profit organizations, the solution should be 'advancing the mission'. |

| NFR-8 | Dynamicity | IoT devices may have the capability to adapt dynamically and change based on their conditions. |
|---|---|---|
| NFR- 9 | Desirability | Navigation should be made easy. The user should be able to search and find the information he needs without much hassle. |

# 5. PROJECT DESIGN

## Data Flow Diagrams
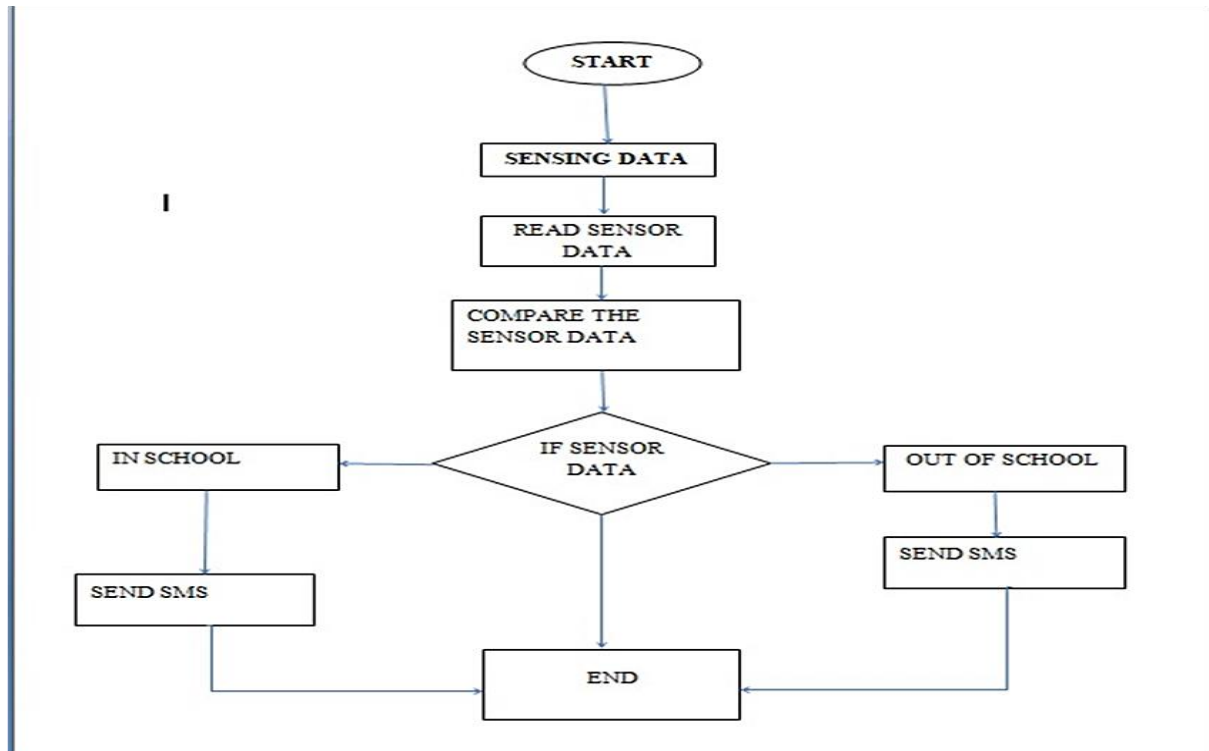


***Figure 5.1:*** *Data Flow Diagram*

## Solution & Technical Architecture

## Technical Architecture:

Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.

Example: Monitoring and Notification to parents for Child Safety.

Reference:

https://www.ibm.com/blogs/cloud-computing/2017/12/21/ibm-cloud-parents.
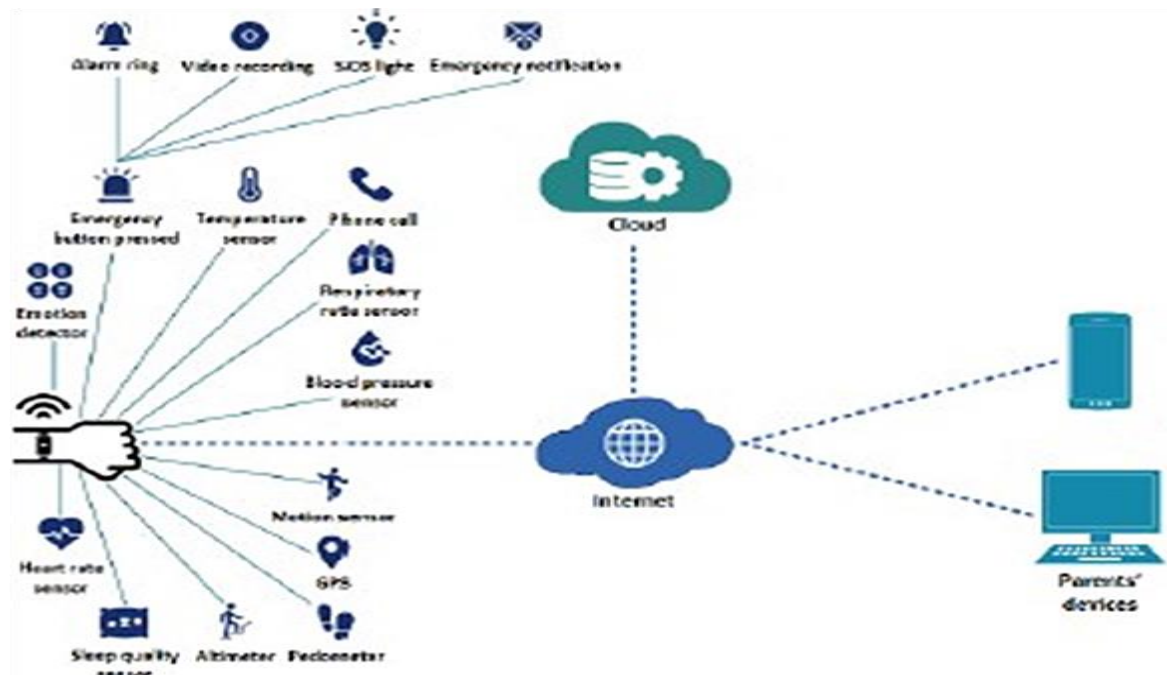
**Architecture**



*Figure 5.2: Architecture for child safety System*

**Guide Lines:**

1. Enable tracking of the child's location and capturing of data remotely such as temperature, pulse, respiratory rate, quality of sleep and many more.

2. To show the child's actual data with reference value

3. 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

4. Develop a prototype of IoT wearable smart band connected to parents' mobile apps so that they can monitor the actual condition of children at anytime and anyplace.

# 6. PROJECT PLANNING & SCHEDULING

## Sprint Planning & Estimation

| Sprint | Functional Requirement (Epic) | User Story / Task |
|---|---|---|
| Sprint-1 | Paring IoT Device with Parents mobile | The IoT device is paired with parents mobile by internet connection. It is used to track the child activities. |
| Sprint-2 | Live Location Tracking | the GPS location is updated to the cloud at regular intervals or on request, whenever parent want to monitor the location of safety device then parental app can be used which fetches all the data from the updated cloud and also display the current/live location of the safety gadget. |
| Sprint-3 | Panic Alert System: | The gadget is equipped with panic alert system feature which mainly consist of a button that is triggered only during certain abnormal/panic situations, this button is programmed in such a way that, once it is triggered then multiple alerts in various forms occurs within few seconds of time, SMS and also phone call is triggered to the parental phone from the safety gadget GSM module to the parental phone, which consists of current location of gadget fetchedfrom its GPS and a pre-installed panic message seeking for help. |
| Sprint-4 | Stay Connected Feature: | This feature is to communicate between safety gadget (GSM module) and parental phone always connected irrespective of the situation, safety gadget can make a phone call anytime to parental phone and vice-versa. |

| Sprint-5 | Health Monitoring System: | The gadget consists of heart beat and temperature sensor which is used to monitor the general health condition of child. Any abnormalities being detected in the health monitoring parameters by the safety gadget then an immediate alert is sent on the parental app via Wi-Fi.<br>Also, displays on parental app |
|---|---|---|
| Sprint-6 | Gadget Plug and Unplug Monitoring: | This feature is to keep monitoring if the safety gadget is plugged or not by monitoring the contact switch, necessary alerts are provided on parental app whenever the device is unplugged. |
| Sprint-7 | Boundary Monitoring System: | Binding gadget is the device which is used to satisfy this feature along with safety gadget and parental phone. This gadget is used to monitor safety gadget within a bounded area using wireless technology. Once the safety gadget is moving out of the threshold distance from the BLE<br>listener device then an alert is provided on device itself, which will be used by parent/guardian. |

### Sprint Delivery Schedule

Product Backlog, Sprint Schedule, and Estimation

| Sprint | Total Story Points | Duration | Sprint Start Date | Sprint End Date (Planned) |
|---|---|---|---|---|
| Sprint-1 | 15 | 6 Days | 24 Oct 2022 | 29 Oct 2022 |
| Sprint-2 | 15 | 3 Days | 31 Oct 2022 | 02 Nov 2022 |
| Sprint-3 | 10 | 3 Days | 03 Nov 2022 | 05 Nov 2022 |
| Sprint-4 | 10 | 3 Days | 07 Nov 2022 | 09 Nov 2022 |
| Sprint-5 | 10 | 3 Days | 10 Nov 2022 | 12 Nov 2022 |
| Sprint-6 | 10 | 3 Days | 14 Nov 2022 | 16 Nov 2022 |
| Sprint-7 | 10 | 3 Days | 17 Nov 2022 | 19 Nov 2022 |

# 7. CODING & SOLUTIONING

**Front-end**

**Design Child**

**Login Page**

The child login page needs some child information for verification. Such as (Children name, Children phone number and parent phone number). After submission this information child can log in and a SMS will sent to parent phone with a code and parent can added this child in his/her app through this code.



Figure: 7.1 Child Login Part of the system

**Child Calculator Part**

After login this application child can see a calculator. Child can do calculation using this calculator. Calculator does not need to use for data passing.
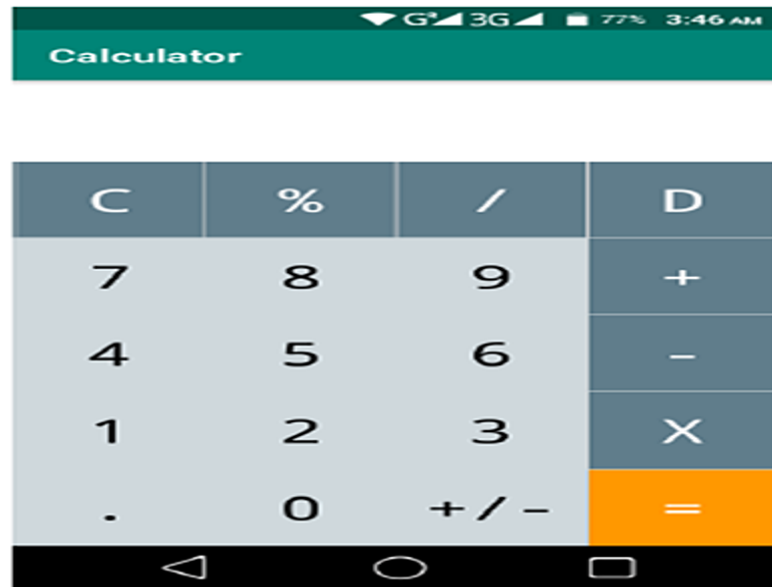


Figure 7.2 Child Calculator Part of the system

**Parent sign up page**

Parent need to sign up first for sign in through name, email, phone, password.
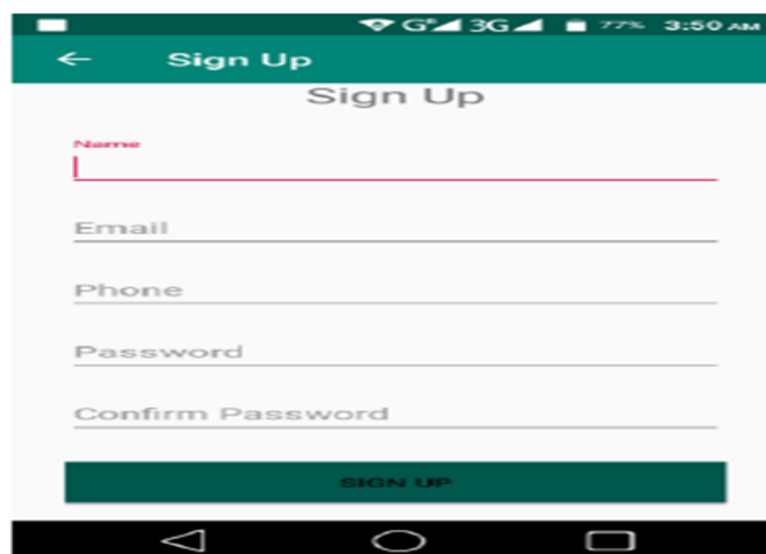


Figure 7.3 Parent sign up part of the system

**Parent Sign in page**

      Parent need to sign in through email and password this application, for getting child information.
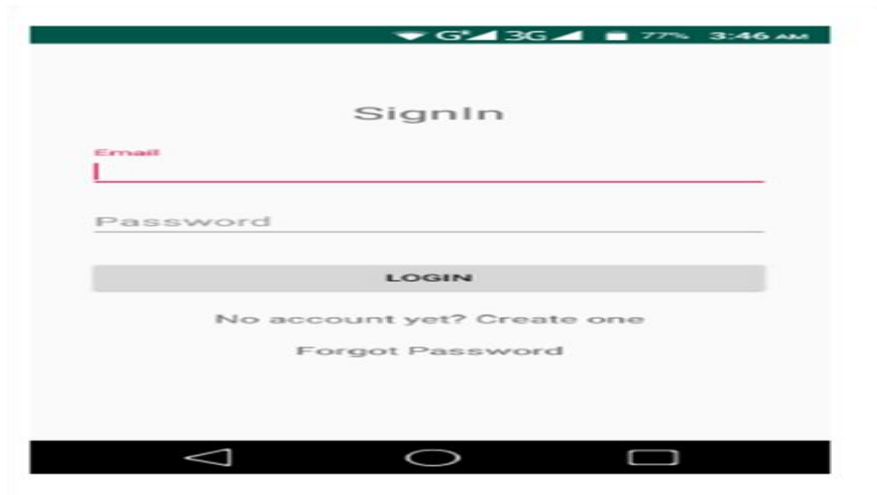


Figure 7.4 Parent sign in part of the system

**Child add page**

Parent will add child through code that comes from child's phone in this page
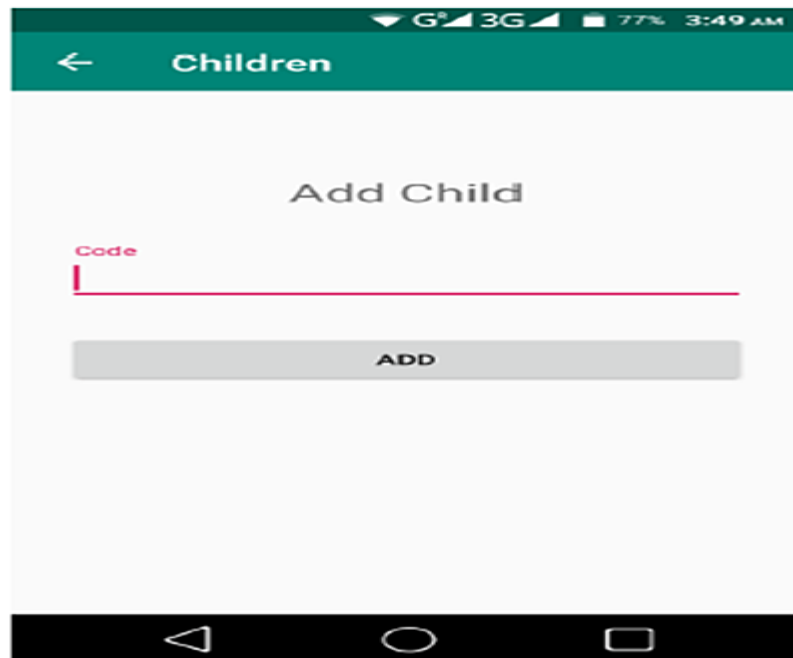


Figure 7.5 Child add page part of the system

**Child List Page**

This is the child list page. Parent can add more children for monitoring.
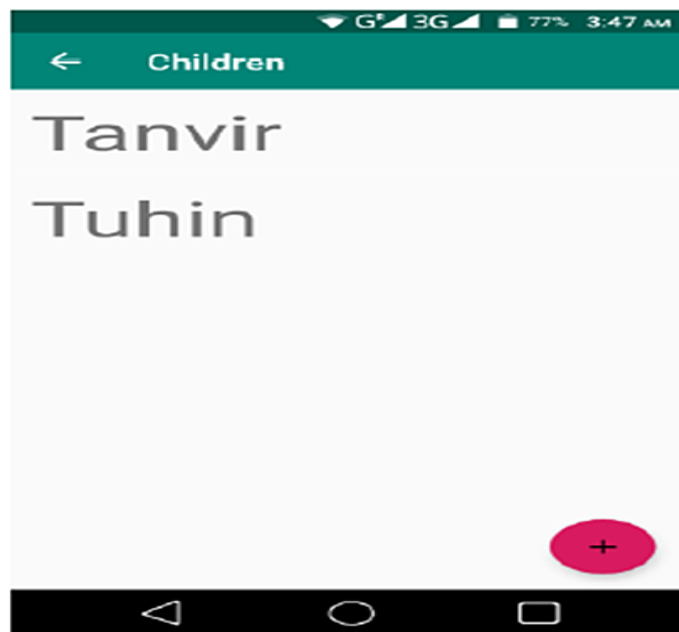


Figure 7.6 Child list page part of the system

**Child information list page**

Parents can see child phone's contacts, call logs, messages and location.
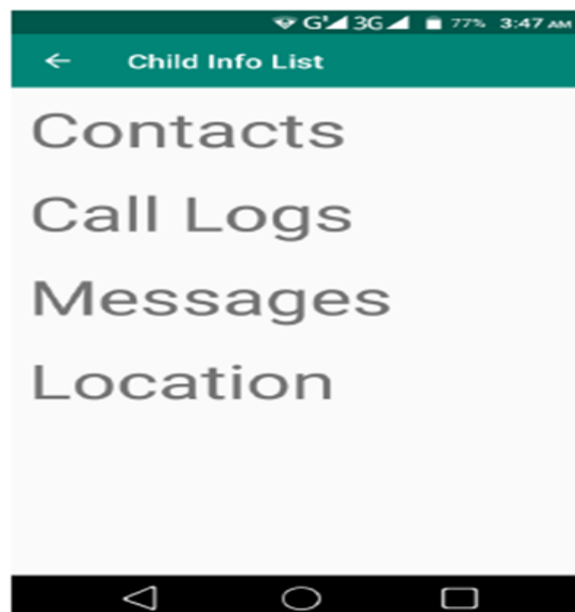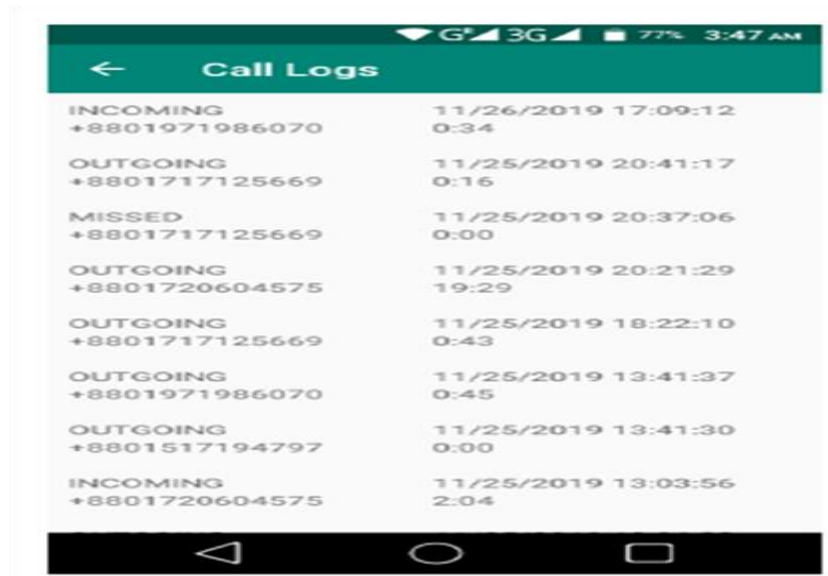


Figure 7.7 Child information page part of the system

## Child's Call Log page

This is the child log page. Parents can see child call logs such as (incoming call, outgoing call), time, Date and duration of call.
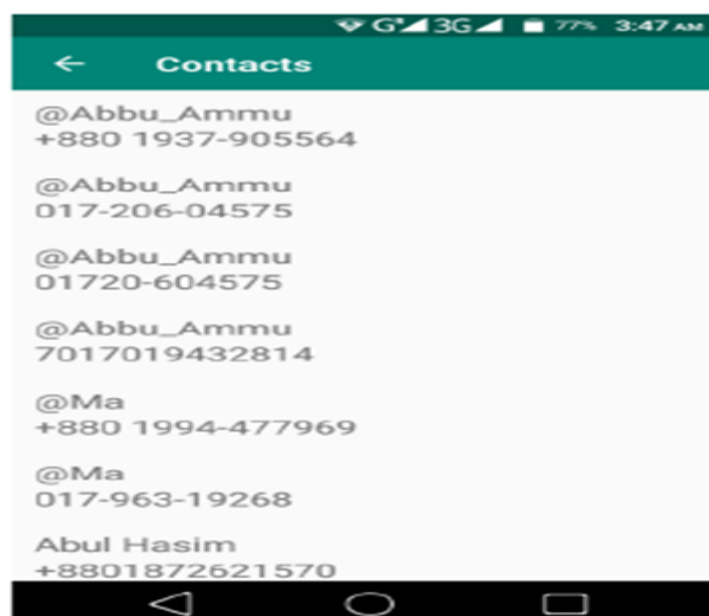


Figure: 7.8 Child's call log page part of the system

## Child's Contract page

This is the child contract page. Parent will see child's all Contracts.



Figure 7.9 Child's Contract page part of the system

**Child's Location page**

In this page parent can track child location and see where are going their children.



Figure 7.10 Child's Location page part of the system

**Child's SMS page**

Parent can see child's phone's messages and see who send message.



Figure 7.11 Child's Location page part of the system

**Back-end Design**

**Child Database**

      This is the child database page. In this database, is stored child's phone call logs, contacts, messages, location.
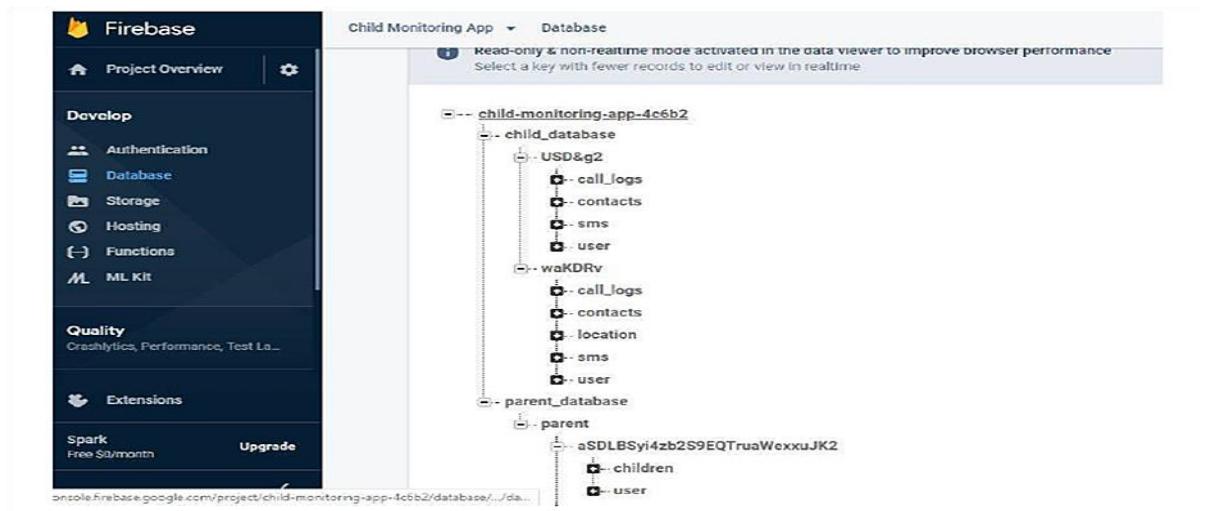


Figure 7.12 Child's database page part of the system

**Parent Database**

      This is the parent database page. There is two parts one is children and another is user. In user part are store parent's email, phone number, user id and User Name. On the other side in children part are stored all child location, SMS, Contract, Call log.
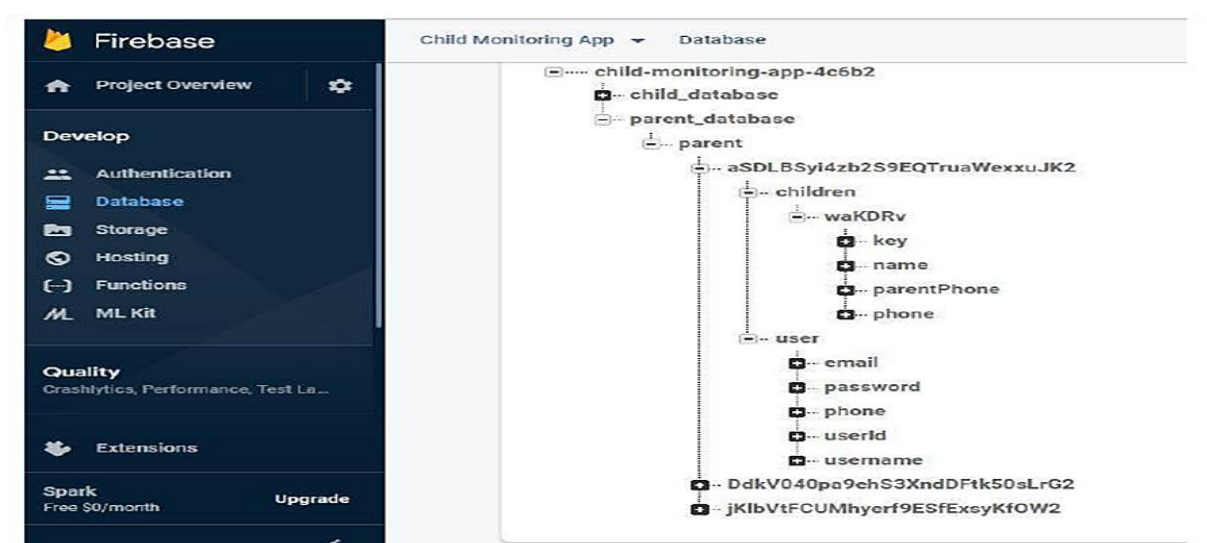


Figure 7.13 Parent database page part of the system

# 8. TESTING

## Testing and Integration

Testing and integration is most important because app already working or not this kind information we can get using this. That means all functionality of project must be checked. It is the software testing phase. Integration testing is conducted to evaluate the compliance of a system or component with specified functional requirements. It is occurs after unit testing and before validation testing.

## Test Cases

| Test case ID | Feature Type | Component | Test Scenario | Pre-Requisite | Steps To Execute | Test Data |
|---|---|---|---|---|---|---|
| TC_ID_01 | UI | Home Page | To track and get exact location of children | | GPS Module | |
| TC_ID_02 | UI | Home Page | It increase the interaction of family's with their children | | previously there were approaches that were implemented to solve child monitoring system. Many schools and families use different types of approaches to locate and monitor children. | |
| TC_ID_03 | Functional | Home page | To store and retrieve the necessary data on the families mobile phone using real time sensors | | Sensor monitor | |

| Expected Result | Actual Result | Status | Commnets | TC for Automation(Y/N) | BUG ID | Executed By |
|---|---|---|---|---|---|---|
| Tracking | Working as expected | Pass | | | | |
| Information Passed | Working as expected | pass | | | BUG-1234 | |
| Sensor reply to input. | Working as expected | pass | | | | |

**User Acceptance Testing**

## 1. Purpose of Document

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

## 2. Defect Analysis

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

| Resolution | Severity1 | Severity2 | Severity3 | Severity4 | Subtotal |
|---|---|---|---|---|---|
| By Design | 12 | 5 | 3 | 4 | **24** |
| Duplicate | 2 | 0 | 3 | 0 | **5** |
| External | 3 | 5 | 0 | 2 | **10** |
| Fixed | 10 | 1 | 5 | 15 | **31** |
| Not Reproduced | 0 | 0 | 2 | 0 | **2** |
| Skipped | 0 | 0 | 2 | 1 | **3** |
| Won'tFix | 0 | 4 | 3 | 2 | **9** |
| Totals | **27** | **15** | **18** | **24** | **84** |

## 3. Test Case Analysis

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

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| Print Engine | 8 | 0 | 0 | 8 |
| Client Application | 50 | 0 | 0 | 50 |
| Security | 3 | 0 | 0 | 3 |

| | | | | |
|---|---|---|---|---|
| Outsource Shipping | 4 | 0 | 0 | 4 |
| Exception Reporting | 10 | 0 | 0 | 10 |
| Final Report Output | 5 | 0 | 0 | 5 |
| Version Control | 3 | 0 | 0 | 3 |

**Location Testing**

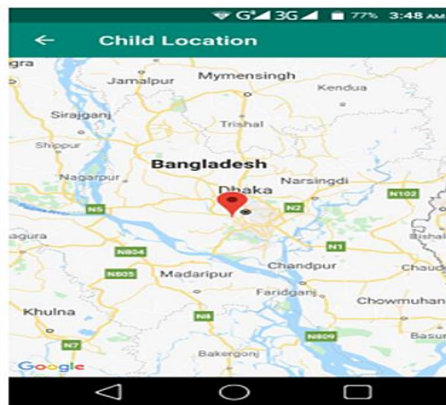Parent shall tracking children location through add child in his app.



Figure 8.1 Location testing page part of the system

**Contact Testing**

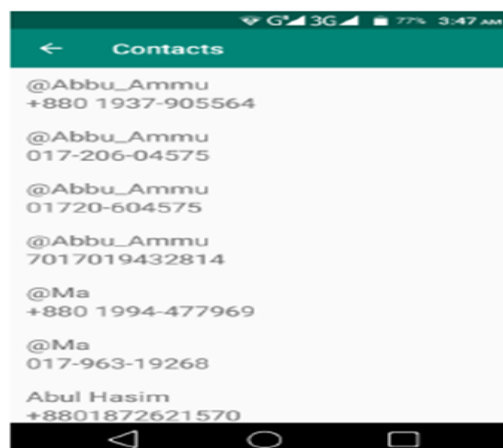Parent can know child's phone's contact doing contact testing. Figure 8.2 shows the Contract testing of the system.



Figure 8.2 Contract testing page part of the system

**Message Testing**

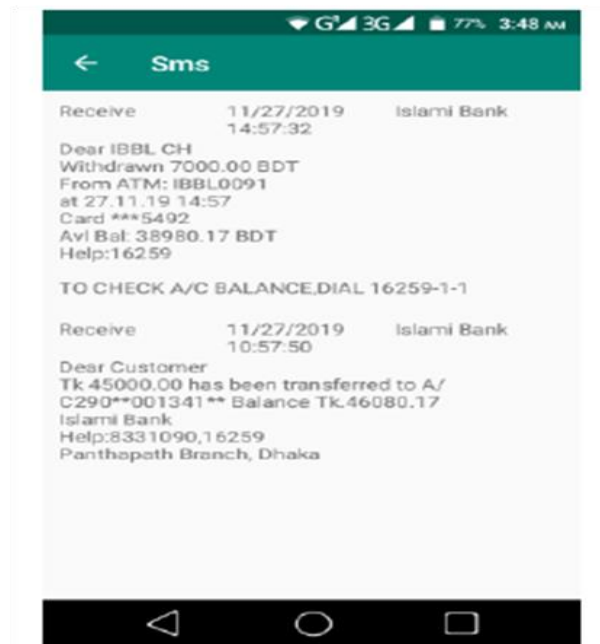Because of message testing parent can see child's phone messages.



Figure 8.3 Message testing page part of the system

**Call log Testing**

Doing call log testing we know child's phone's incoming and outgoing call with date, time and duration.
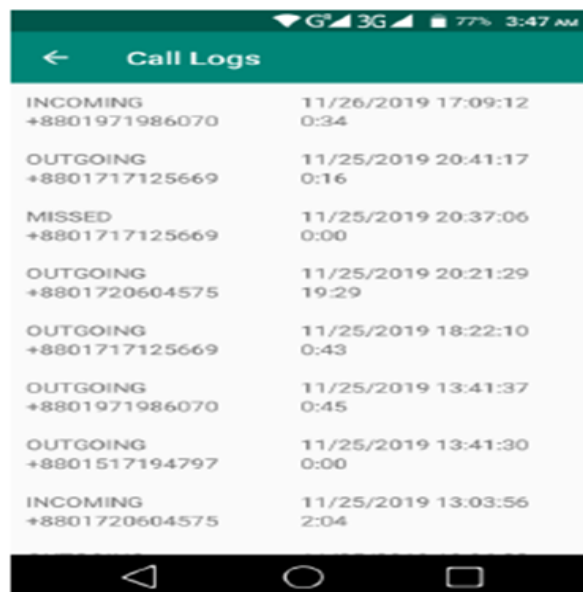


Figure: 8.4 Call log testing page part of the system

**Message Verification Testing**

This is the Massage verification testing page of the system. When child will login his/her application then a verification code will go to parent phone.



Figure 8.5 Message testing page part of the system

**Sign Up Testing**

This is the parent sign up page. Parent will sign up through Name, Email, Phone Number and Password.
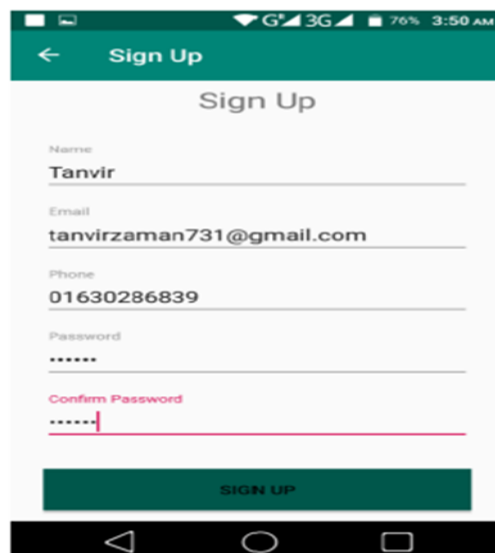


Figure 8.6 Sign up testing page part of the system

**Sign in Testing**

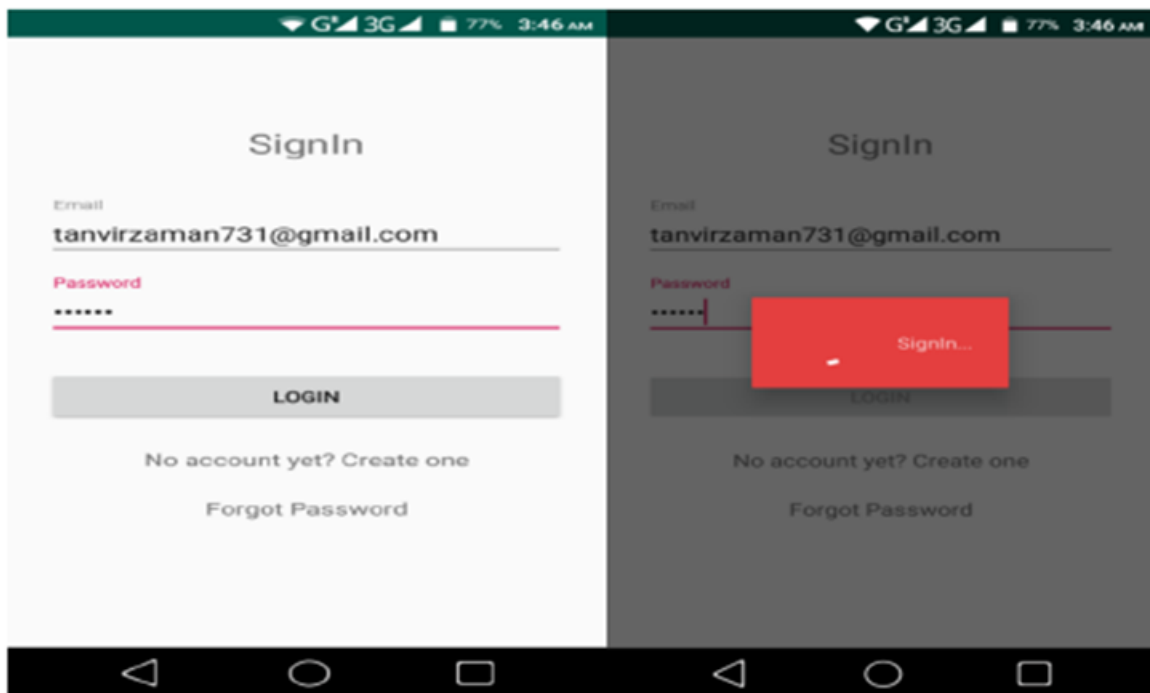This is the sign in page. Parent must sign in for see child data.



Figure 8.7 Sign in testing page part of the system
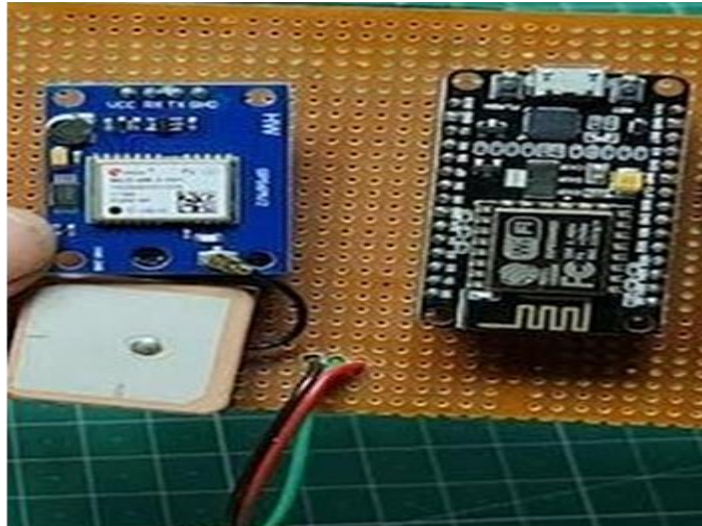
# 9. RESULT

## System Design



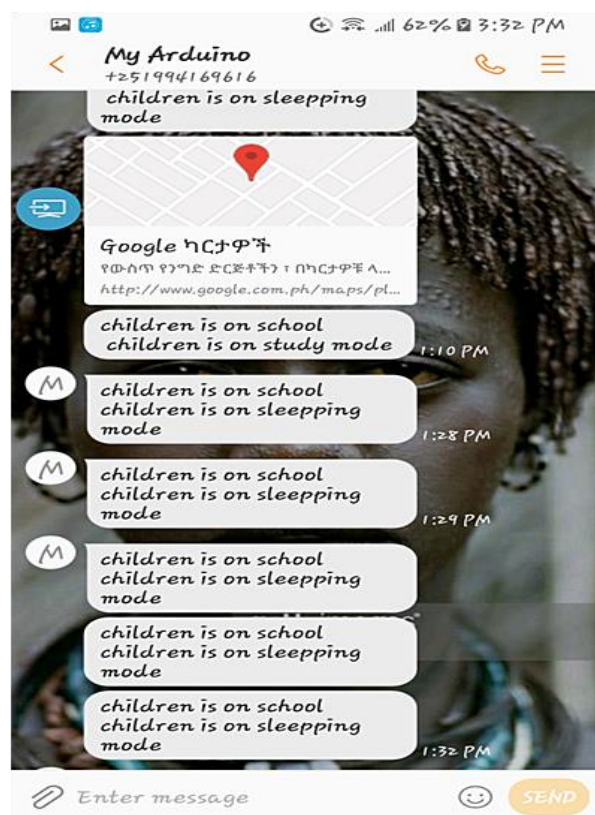**Figure 9.1:** System Design

## Children status on school

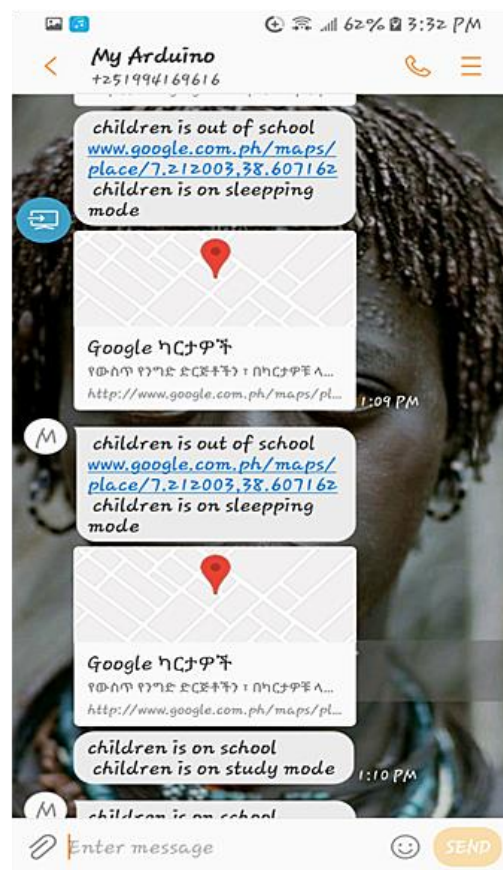

**Figure 9.2:** children status on school

**Children status out of school**



**Figure 9.3:** children status out of school

**Performance Metrics**

Child safety and tracking is a major concern as the more number of crimes on children are reported nowadays. With this motivation, a smart IoT device for child safety and tracking is developed to help the parents to locate and monitor their children. The system is developed using LinkIt ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and also GPS, GSM & digital camera modules. The novelty of the work is that the system automatically alerts the parent/caretaker by sending SMS, when immediate attention is required for the child during emergency. The parameters such as touch, temperature &heartbeat of the child are used for parametric analysis and results are plotted for the same. The above system ensures the safety and tracking of children.

# 10. ADVANTAGES & DISADVANTAGES

## ADVANTAGES

1. It can assist in the smarter control of homes and cities via mobile phones.

2. It enhances security and offers personal protection. By automating activities, it saves us a lot of time.

3. Information is easily accessible, even if we are far away from our actual location, and it is updated frequently in real time.

## DISADVANTAGES

1. The system is dependent on communication signal/network signal for the smart gadget to trigger automatic phone call/SMS during panic situation.

2. It can be difficult to detect when network signal is not reachable/weak/when the smart gadget moves outside the boundary range.

3. Hence, it can be improved by increasing the range.

# 11. CONCLUSION

This research demonstrates Smart IoT device for child safety and tracking, to help the parents to locate and monitor their children. If any abnormal readings are detected by the sensor, then an SMS and phone call is triggered to the parents mobile. Also, updated to the parental app through the cloud. The system is equipped with GSM and GPS modules for sending and receiving call, SMS between safety gadget and parental phone. The system also consists of Wi-Fi module used to implement IoT and send all the monitored parameters to the cloud for android app monitoring on parental phone. Panic alert system is used during panic situations alerts are sent to the parental phone, seeking for help also the alert parameters are updated to the cloud. Boundary monitoring system is implemented on safety gadget with the help of BEACON technology, as soon as the safety gadget moves far away from the BLE listener gadget an alert is provided to itself. 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 Atlantis Highlights in Computer Sciences, volume 4 470 mobile phone. Hence, the future enchantments 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

1. 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.

2. This system can be further enhanced by installation of mini camera inside smart gadget for better security so that live footage can be seen on parental phone during panic situations. The system can be modified by installation of small solar panels for charging the battery of smart gadget to gain maximum battery back.

## 13.APPENDIX

Source Code:

```
import json
import wiotp.sdk.device
import time
myConfig={
    "identity": {
        "orgId":"idajfy",
        "typeId": "NodeMCU",
        "deviceId":"12345"
    },
    "auth": {
        "token": "12345678"
    }
}
client = wiotp.sdk.device.DeviceClient(config=myConfig, logHandlers=None)
client.connect()
```

```python
while True:
    name="childtracker"
    #in area location

    #latitude=10.99544
    #longitude=78.77988

    #out area location

    latitude=10.994131
    longitude=78.780154
    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()
```

**GitHub Link:**
**https://github.com/IBM-EPBL/IBM-Project-43754-1660719261**

**Project Demo Link:**
**https://drive.google.com/file/d/19h602Ah_rM2O-CUvu7Y3X9UYJl8Tugjq/view?usp=share_link**