Project Report

IoT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION

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1. INTRODUCTION

Project Overview:

The project is IoT Based Safety Gadget for Child Safety Monitoring & Notification. It is mainly streamed towards child safety solutions by developing a gadget that can be used to monitor the child.

Purpose:

Child safety and tracking has been a huge concern due to the surge of the number of crimes on children. Hence the purpose of this project is to provide an application that can be used to ensure the safety of a child.

2. LITERATURE SURVEY

ABSTRACT :

This paper is based on IOT (Internet of Things). As we know in the present era everything is based on digital technology. Human beings are going to connect to each other by using mobile networks. This paper proposes an SMS based solution to reduce parents' insecurity and schools to track children in real time. Different devices are connected with a
single device through. The concerned device is connected to mobile via SMS. The device can be used by stockholders to track children and get real time data. The main Advantage of the proposed system is to send location by using a mobile network (GSM). Here a prototype model (device) is created which is hardware based. The work comprises ARDUINO UNO as microcontroller, along with GPS and GSM module. This device will also have the facility of different status of children by measuring the speed of hand movement of children.

Keywords:

Child security system, Child monitoring system, Internet of Things (IOT), IOT device, Smart band

I. INTRODUCTION

Nowadays, crimes always occur. This scenario is not involving adults only, but also happens to children. Parents concern more about serious cases such as missing children, abduction and rape. The crimes also involving school children have been reported in newspapers. Although the school has guards that are posted on school grounds 24 hours a day, which simply is not enough to monitor the student. The use of IOT in this device is motivated by the need for a child security system in Malaysia due to child safety issues resulting from increasing cases of child -related crime. The happiness of the parents is caring and helping the child to grow well in the beautiful world. But children are facing so many problems from the outside world. It may affect the mind to avoid having friendliness with everyone. And parents cannot sit with their children for 24x7 hours to secure their children and monitor the children's activities. When a child is going to school, then her security and activities are assured by the school and the members of school only.

IOT in Child security:

Now the modern world needs to have advanced things through composing different technologies for helping to find solutions for their real life problems. The new technology Internet of Things (IOT) provides much support for making advanced devices and tools to design and implement the solutions to real world life issues. Although some studies have looked into using personal monitoring methods for children based on wireless communication, we exploit such devices to monitor the location and activities of children and to proactively notify guardians of potential safety risks. After sending children to school, the parents may get the SMS about whether the child reached the school or not. If the system fails in the school, then the parents have made a call to the teacher to confirm about their child present in the school. But this manual approach may not give 100% satisfied results on all occasions. Hence the

tracking sensor may give a 100% perfect result to the parents‟ Smartphone about the status and location of their child. Here we have taken one more problem that the level of people who are near to the child.

II. LITERATURE REVIEW

N.Senthamilarasi, N.Dhivya bharathi, D. Ezhilarasi and R.B.Sangavi:-Child Safety Monitoring System Based on IOT- NOV 2019:

The overall percentage of child abuse cases filed nowadays in the world is about 80%, out of which 74% are girl children and the rest are boys. For every 40 seconds, a child goes missing in this world. Children are the backbone of one's nation, if the future of children was affected, it would impact the entire growth of that nation. Due to the abuse, the emotional and mental stability of the children gets affected which in turn ruins their career and future. These innocent children are not responsible for what happens to them. So, parents are responsible for taking care of their own children. But, due to economic conditions and the aim to focus on their child's future and career, parents are forced to crave for money. Hence, it becomes difficult to cling on to their children all the time. In our system, we provide an environment where this problem can be resolved in an efficient manner. It allows parents to easily monitor their children in real time just like staying beside them as well as focusing on their own career without any manual intervention.

M Nandini Priyanka, S Murugan, K N H Srinivas, T D S Sarveswara Rao, E Kusuma Kumari:-Smart IOT Device for Child Safety and Tracking :

Child safety and tracking is a major concern as the number of crimes on children is 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 Link It 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 an 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.

P. Poonkuzhali1, R.Aarthi 2, Yazhini.V.M3, Yuvashree.S4, Vidhyalakshmi .G:-Child Monitoring and Safety System Using WSN and IOT Technology:

This paper presents the design and implementation of a portable IOT-based safety and health monitoring system for children through a sensor embedded health monitoring device for safety and emergency services. It is known that technological advancements are increasing at a faster pace. But the utilization of technologies in various sectors is very low. We know that people of different age groups face different difficulties. But the security for children is very low. There are a lot of cases registered regarding child safety. Nowadays, the schools and the parents are very much worried about their school children for school transport and other places. So, the safety and monitoring of school children is very much difficult. In this project we are introducing the IOT based embedded system used in this project. So we propose a system to continuously monitor the parameters of the child and also their location for safety purposes. The system provides smart child tracking.

[4]FITSUM TESFAYE: IOT BASED CHILDREN MONITORING SYSTEM:

Human beings are going to connect to each other by using mobile networks. This paper proposes an SMS based solution to reduce parents' insecurity and schools to track children in real time. Different devices are connected with a single device through. The concerned device is connected to mobile via SMS. The device can be used by stockholders to track children and get real time data. The main Advantage of the proposed system is to send location by using a mobile network (GSM). Here a prototype model (device) is created which is hardware based. The work comprises ARDUINO UNO as microcontroller, along with GPS and GSM module.

This device will also have the facility of different status of children by measuring the speed of hand movement of children.

III. PROS

Safety is ensured in every place and it can be monitored from anywhere. Easy to use, weightless, compatible and low in cost.

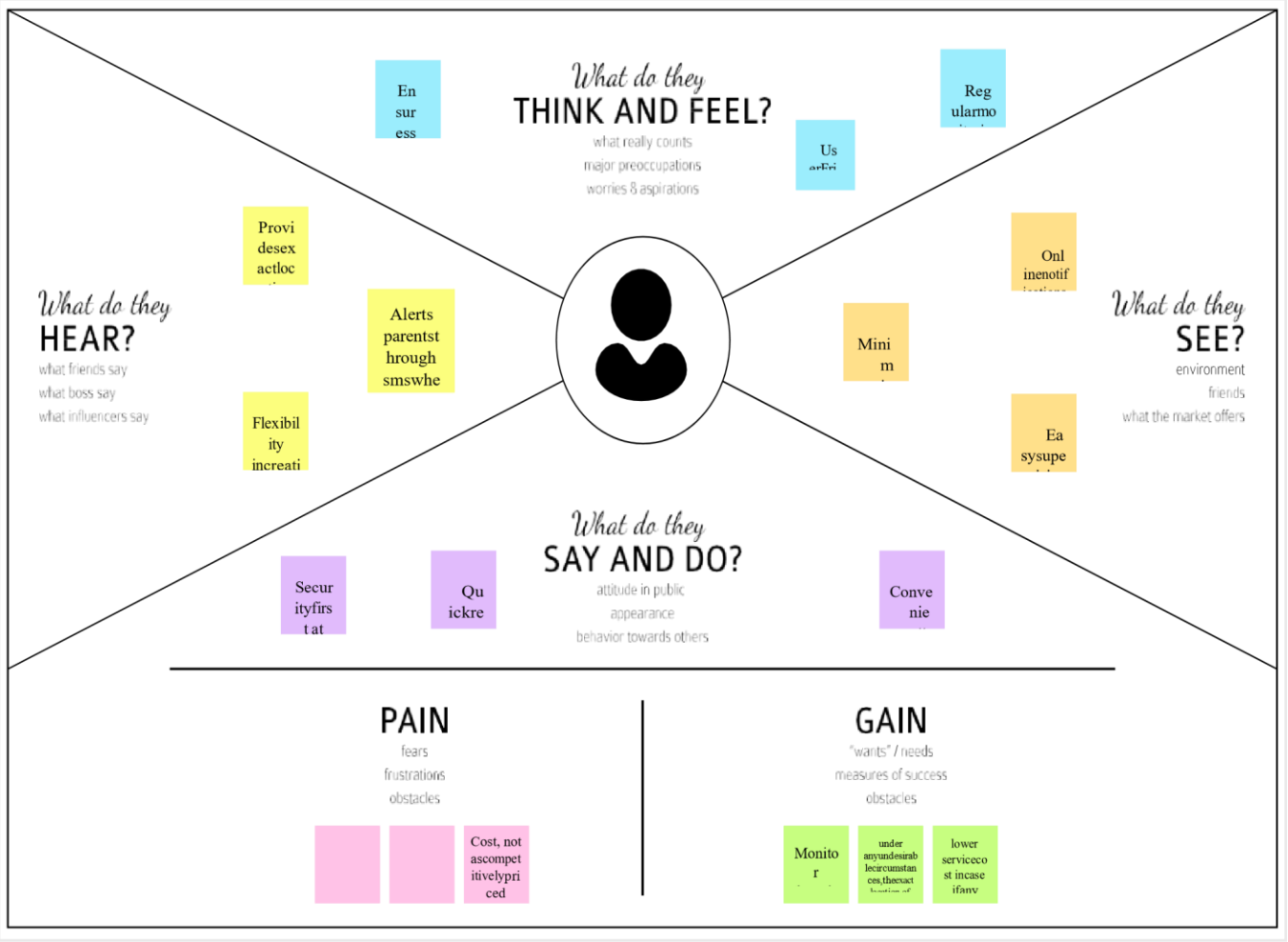
IV. CONS

Parents cannot be able to trace if the band is missed and hard to track the children. If the parent is too far from the location they cannot able to monitor and save the child.

3. IDEATION & PROPOSED SOLUTION

Empathy Map Canvas:

Build empathy and keep your focus on the user by putting yourself in their shoes.



Proposed Solution:

Taking the safety of the child into consideration, the child is provided with a device which helps to monitor the location of the child.

S. No.	Parameter	Description
1	Problem statement (problem to be solved)	The parent/guardian needs to ensure the safety of their children by receiving notifications about the location of the child so that they can regularly monitor the child's activity.
2	Idea/Solution description	A safety gadget to regularly monitor the child's activity. By creating a Geo-fence, location of the child in safety zone could be seen by the parents. With the help of various sensors, temperature, heart-rate, etc. of the child can also be monitored.
3	Novelty/Uniqueness	Instead do fusing wifi and Bluetooth, SMS and E-mail is used to share the details of the child. Also various sensors area also used.
4	Social Impact/Customer Satisfaction	• Children could be regularly monitored. • Information is sent to parents via both SMS and Email so connectivity will not be a barrier.
5	Business Model (financial Benefit)	Data from the device might be very useful for business involving analysis and detection.
6	Scalability of Solution	As the device has GPS tracker, geo-fence can be created over a wide range.

Problem Solution fit:

1.CUSTOMERSEGMENT(S)

Here the customers are the parentsandthechild'sguardian.They shallbe able to track and monitor thechildregularly.

6.CUSTOMERCONSTRAINTS

The parents should have a smartphonewithinternetconnecti vity.

Thedevicemustbesafeandsecure.

5.AVAILABLESOLUTIONS

Merits: The child's exact locationcan be tracked and notification issenttoparentsviasmsande-mail.

Demerits: Needs proper networkconnection.Costliertoimpl ement.

2.PROBLEMS

Parents need to monitor the track on childrenaresoplayfulthattheycouldn' tstayin a place for long time & the parents make regularlymonitoring the child's andensuressafety.

9.PROBLEMROOT/CAUSE

The problem arises as the nottogether and helps in thechild stays within the geo- fencecreated. itdifficult for them to take care of thechild.

7.BEHAVIOUR

The gadget helps in improving parentchild'sactivity and keep a child interaction when they are theirlocation by ensuring whether tightschedule of the activity

3. TRIGGERS

Usage of audio & video to ensure thesafety of the child triggers thecustomer(parents)tousethiswearable crossed.Ittracksthechild'slocationand

10.YOURSOLUTION

Creating a geo fence so thatnotification would be sent to theparents once the limit is ationisnotified totheparents. senditttotheparents

8.CHANNELSOFBEHAVIOUR

Online

Byconnectingtothecloud,thechild'sloc device.

4. EMOTIONS

Offline

Before: As the parents in thisgeneration are mostly about to go ntviasms. oncentration on their child. After:Parents shall be relaxed and mightconcentrate on their work as they havearegulartrackon their child.

While in offline the child's location,heartrateandotherdataarese forwork,theyfeelliketheyhavealackofc

4. REQUIREMENTANALYSIS

Functional requirements:

Following are the functional requirements of the proposed solution.

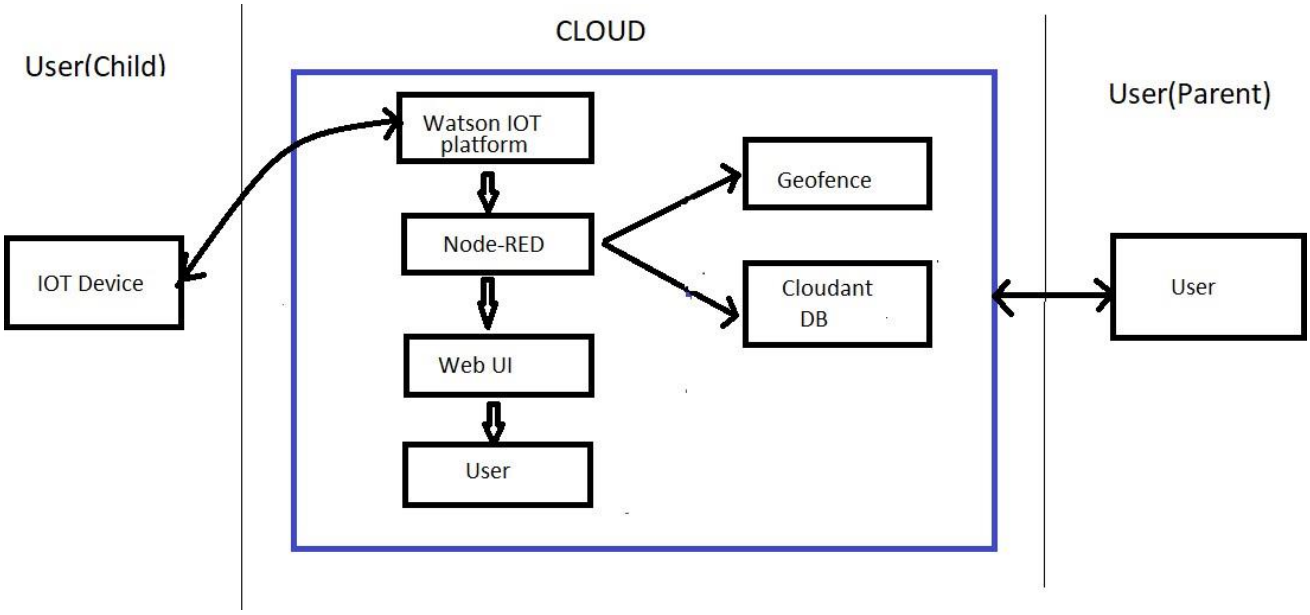
FR No.	Functional Requirement (Epic)	Sub Requirement(Story/Sub-Task)
FR -1	User visibility	Emergency alerts via Fast SMS and through internet
FR -2	User reception	Notifications will be sent to their parents if their child crosses the geo fence and also the location of child is stored in the database
FR -3	User Understanding	Based on the values collected by the device, The user will understand that if they receive any SMS, then their child is in danger.
FR -4	User action	If anything happens to the child, parent needs to take appropriate measures to help and make their feel children safe as soon as the alert received.

Non-functional Requirements: Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR -1	**Usability**	It be required to preclude children before being harmed, an autonomous real-time monitoring system is necessary for every child away from their parents.
NFR -2	**Security**	It be supposed to be designed to wearable without any problems. It would be worn by the children all the time and it should give assurance that it works all the time.
NFR -3	**Reliability**	It should be actively being monitor the child and should send information to the parents all the time. It must recognize the danger caused to the child immediately.
NFR -4	**Performance**	Notification will be sent to the parents if the child across the geo-fence.
NFR -5	**Availability**	It must be active for all day and remain active at least a week for a single charge. So, it would be useful for the parents
NFR -6	**Scalability**	This device ought to have the option to effortlessly change over haul concurring to change and need in requirements.

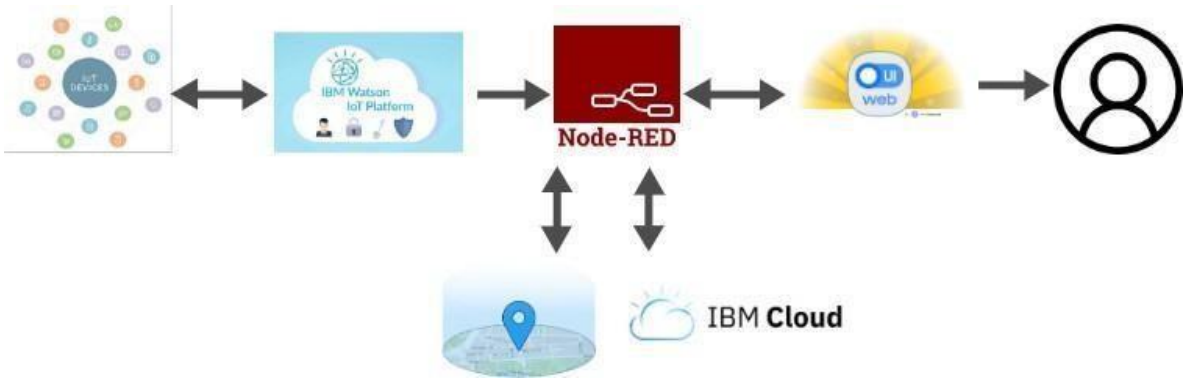
5. PROJECTDESIGN

Data Flow Diagram:



Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table2



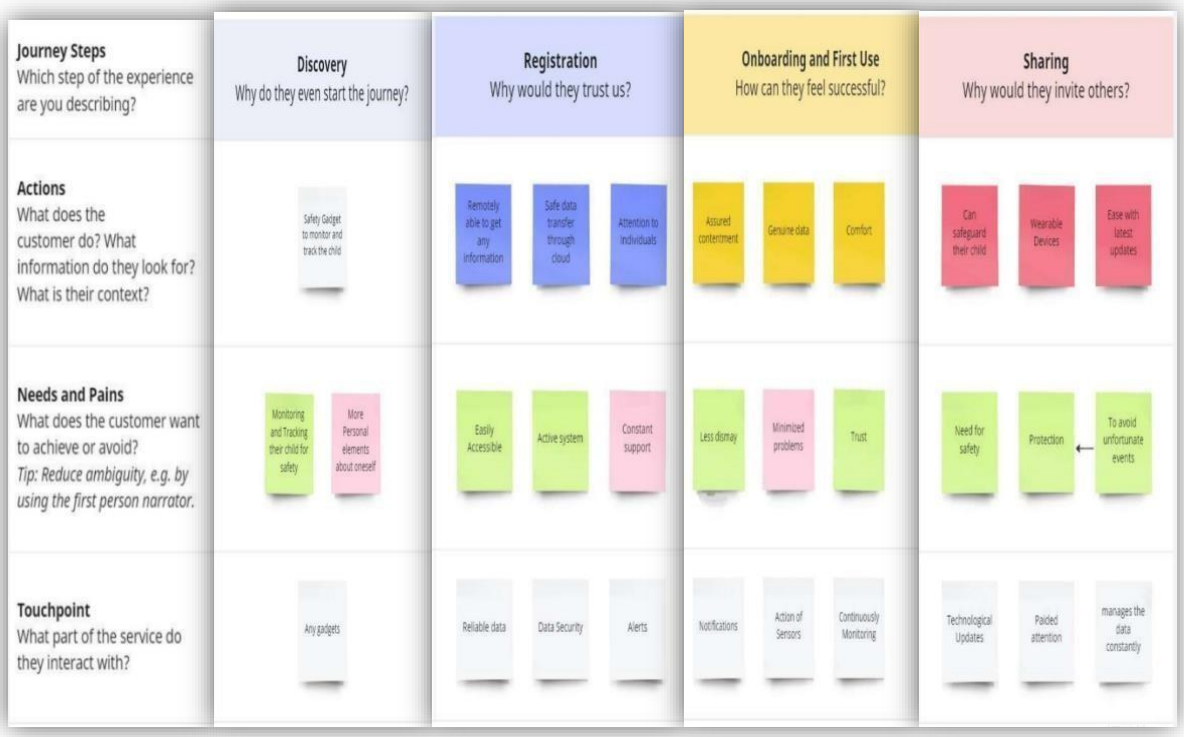
Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	How the user interacts with the application. Web UI	App development
2.	Application Logic	Logic for a process in the application	Python
3.	Database	Data Type, Configurations etc.	Cloud database
4.	Cloud Database	Database Service on Cloud	IBM Cloudant.
5.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local File system
6.	Cloud/Server	1. Cloud server description 2. Local server description	Cloud foundry
7.	Protocol	How data exchange on web	HTTP

Application Characteristics:

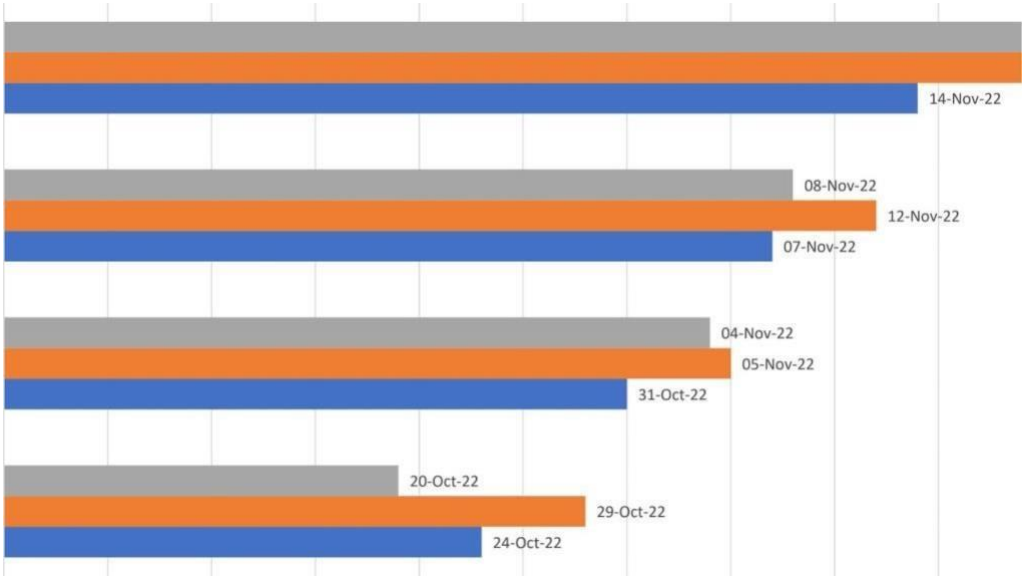
S. No	Characteristics	Description	Technology
1.	Security Implementations	List all the security/access controls implemented, use of firewalls etc.	We are using the IBM cloud, so for every instance of time it updates the Current location of the children to their parents/caretakers.
2.	Scalable Architecture	Justify the scalability of architecture(3–tier,Microservices)	The technology is used to monitor and send alert notification.
3.	Availability	Justify the availability of applications (e.g. use of load balancers, distributed servers etc.)	We are using the geo-fence, a service that triggers an action when a device enters a set location
4.	Performance	Design consideration for the performance of the application	We are using HTTP, for every second the location of the children are sent to The parents.

CUSTOMER JOURNEY



6. PROJECT PLANNING & SCHEDULING

Sprint Planning & Estimation:



7.CODING & SOLUTIONING (Explain the features added in the project along with code)

Feature: 1

It is a website application. **Feature: 2**

Using an account, a parent can create multiple accounts for the multiple children

8. RESULT

Performance Metrics

- Fast updation of child's location
- User Friendly interface
- Low data involvement

9. ADVANTAGES & DISADVANTAGES

Advantages

- A parent can access the child's location 24x7.
- It provides real time detection.
- Parent receives instant notification when the child crosses the geo-fence.
- Easy to use interface.
- A parent can create as many as nodes for multiple children.

Disadvantages

- Our application cannot be used without internet connection.
- To access the child's location the parent has to access the web application.

10. CONCLUSION

A parent can access their child's location in a real time way. The child tracker frequently updates the location of the child. Any parent can make use of this application to track their child after establishing a geo-fence around their child. Hence, this application serves as a platform that can be used to monitor a child and ensure safety of the child.

11. FUTURESCOPE

- The application can be made an offline application in order for people to access their child's location in the absence of internet connection.

- The application is currently a web based application. It has scope to be made into a hybrid application by making it into an active application.

Git Hub Link:-

https://github.com/IBM-EPBL/IBM-Project-50736-1660922951