

# **IOT BASED SAFETY GADGET FOR CHILD SAFETY MONITORING AND NOTIFICATION**

**A PROJECT REPORT**  
*submitted by*

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## **ABSTRACT**

Nowadays, crime rate associated with children keeps increasing due to which draws peoples' attention regarding child safety. This research aims to develop a device that can track a child's whereabouts using GPS, as well as having a panic button that can warn the parent by using a GSM module to call for help. Android parental software is created to control and track the device at any time. Smart gadget device is always linked to parental phone, which can receive and make calls as well as send and receive SMS on gadget via GSM module. Wireless technology is also implemented on device, which is useful to bind the gadget within a region of monitoring range; if gadget moves out of monitoring range, alert will be triggered on binding gadget, helping you keep a virtual eye on child. Health monitoring system on gadget checks parameters like heartbeat/pulse rate and temperature is included. Using a contact switch, the gadget also keeps track of whether it is plugged in or not and notifies the parent if it is unplugged. The future improvements of this device will be adding more child security features so that child safety is guaranteed.

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## **INTRODUCTION**

The internet of things (IoT) refers to the set of devices and system that stays interconnected with real-world sensor and to the internet. During years' Child safety is under threat and it is very important to provide a technology-based solution which will help them under panic situations and monitor them using a smart gadget. The proposed system is equipped with GSM and GPS modules for sending and receiving call and SMS between safety gadget and parental phone, the proposed system also consists of Wi-Fi module used to implement IoT and send all the monitoring parameters to the cloud for android app monitoring on parental phone. Android application can be used to track the current location of safety gadget using its location coordinates on parental phone android app and via SMS request from parent phone to safety gadget. Panic alert system is used during panic situations and automatic SMS alert and phone call is triggered from safety gadget to the parental phone seeking for help and monitored for plug and unplug from hand, as soon the gadget is unplugged from hand a SMS is triggered to parental phone and the alert parameter is also updated to the cloud. Heartbeats, temperature is monitored, and the values are updated to cloud continuously for parent app monitoring. 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 binding gadget an alert is provided to parent on binding gadget. The system is used to monitor the health parameters and used for location tracking during necessary situations in safety concern.

## **LITERATURE SURVEY**

[1] Authors: M Nandini Priyanka, S Murugan, K. N. H. Srinivas, T. D. S. Sarveswararao, E. Kusuma Kumari. Title: Smart IoT Device for Child Safety and Tracking. Published in 2019 IEEE. The system is developed using Link-It ONE board programmed in embedded C and interfaced with temperature, heartbeat, touch sensors and 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. Merits: The parameters such as touch, temperature & heartbeat of the child are used for parametric analysis and results are plotted for the same. Demerits: To implement the IoT device which ensures the complete solution for child safety problems.

[2] Authors: Akash Moodbidri, Hamid Shahnasser Title: Child safety wearable device. Published in 2017 IEEE. The purpose of this device is to help the parents to locate their children

with ease. Now there are many wearables in the market which helps to track the daily activity of children and helps to find the child using Wi-Fi and Bluetooth services present on the device. Merits: This wearable over other wearable is that it can be used in any phone, and it is not necessary that an expensive smartphone is required and doesn't want to be very tech savvy individual to operate. Demerits: As, this device's battery gives short lifetime. High power efficient model will have to be used which can be capable of giving the battery life for a longer time.

[3] Authors: Aditi Gupta, Vibhor Harit. Published in 2016 IEEE. Title: Child Safety & Tracking Management System by using GPS. This paper proposed a model for child safety through smart phones that provides the option to track the location of their children as well as in case of emergency children can send a quick message and its current location via Short Message services. Merits: The advantages of smart phones which offers rich features like Google maps, GPS, SMS etc. Demerits: This system is unable to sense human behavior of child.

[4] Authors: Dheeraj Sunehera, Pottabhatini Laxmi Priya. Title: Children Location Monitoring on Google Maps Using GPS and GSM. Published in 2016 IEEE. This paper provides an Android based solution for the parents to track their children in real time. Different devices relate to 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 location services provided by GSM module. It allows the parents to get their child's current-location via SMS. Merits: A child tracking system using android terminal and hoc networks. Demerits: This device cannot be used in rural areas.

## **PROBLEM STATEMENT**

Every 40 seconds, a child goes missing in this world, which has an impact on the entire growth of the nation. A smart band has been proposed to monitor the safety of children using IoT technology. Parents know what is happening remotely and can act if something goes wrong. This project enables parents to easily monitor their children in real time just like staying beside them, as well as focus on their own career without any manual intervention. In this system, the collected values from every sensor and the location value from GPS are used to detect the status of the child and alert the respective guardians using GSM accordingly.

## **IDEA / SOLUTION DESCRIPTION**

Our project is IoT based safety gadget for child safety monitoring and notification. This project is about tracking the child's location by setting geofences and using GPS tracker

in wearable bands. This wearable smart band is waterproof, chargeable and it is equipped with sensors.

## **METHODOLOGY**

The system also includes an Android app namely Parental App which will be developed and installed on parental phone.

1) *Live Location Tracking:* Safety gadget contains a GPS module which will fetch the current location and sends it to the microcontroller for required processing, the safety gadget is also installed with the GSM module to respond for location request sent via SMS from parental phone.

2) *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 a notification on parental app is triggered via Wi-Fi on safety gadget communicating to cloud where parental app receives the information.

3) *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. Safety gadget which will be displayed on its screen.

4) *Health Monitoring System:* The gadget consists of heartbeat 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. Also, displays on parental app.

5) *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.

6) *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 listener device then an alert is provided on device itself, which will be used by parent/guardian. This feature of binding gadget is designed to work independently without phone network signal/internet so that safety gadget can even be under monitoring when it reaches remote areas where

communication signals are not reachable like forest. A. Software Specification. The Arduino Software (IDE) which is an open-source and makes it easy to write the code as well as to upload into the board. It runs on the Linux, Mac, IOS and Windows. The programs are written in Java, based on the Processing and other open-source software. This software makes the interfacing with Arduino-Uno much more reliable. The primary reason for using the GS shield as the mode of communication over Wi-Fi and Bluetooth was that this gadget was aimed at being accessible to any smartphone user. Also, to make the user- friendly as possible.

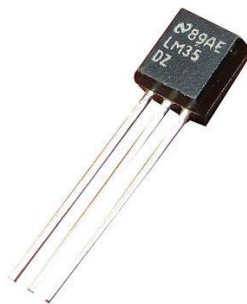
## **COMPONENTS**

### **Pulse Sensor**



The SEN-11574 pulse sensor is mainly used for sensing heartbeat rate. Normally it is a very difficult task to measure the exact heartbeat rate, but this has become so much easy with the help of this pulse sensor module. If we talk about heartbeat, then heartbeat is a periodic signal that is produced by any software or hardware system for giving intimation to normal of working of any system. The stability & accuracy of this sensor drop far behind. An alternative to this kind of sensor is an easy pulse sensor because it is extremely stable.

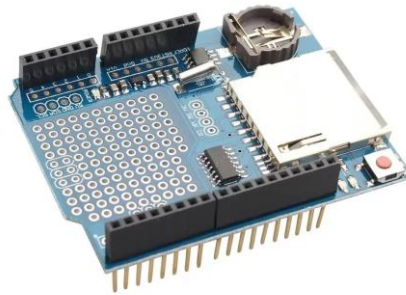
### **Temperature Sensor**



The device can detect the child's approximate location, it can detect the body temperature and the surrounding temperature, humidity and the heartbeat of a child. For

the emergency, the device would have some measures like an alarm buzzer, SO Slight which will notify the bystanders to help the child. The temperature sensors are employed for verifying model suppositions that will improve more economical and safer construction.

## **GSM Module**



The main idea of Global System of Mobile Communication (GSM) is the parent must be sent a text message in the form of SMS using words like “Temperature”, “SOS”, “Location”, “Buzz” etc., to the wearable system. The wearable device sends an acknowledgement in the form of a text showing the location of the child. Distress alarm buzzer present on the wearable device can also be activated by the parents through SMS text to display the SOS signal very clearly and rings an alarm which the nearby public can immediately react to the safety of the child till the parents come or they can try to reach the parents and assist in locating the child.

## **GPS Module**



Global positioning system (GPS) devices utilize data from satellites to locate a specific point on the Earth in a process named trilateration. Meanwhile, a GPS receiver measures the distances to satellites using radio signals to trilateration. And trilateration is like triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies. From there, it'll receive timestamp from

each visible satellites, along with other pieces of data. If the module's antenna can spot 4 or more satellites, it's able to accurately calculate its position and time.

## **Touch Sensor**



Touch Sensors are the electronic sensors that can detect touch. They operate as a switch when touched. These sensors are used in lamps, touch screens of the mobile, etc... Touch sensors offer an intuitive user interface. Touch sensors are also known as Tactile sensors. These are simple to design, low cost and are produced in large scale.

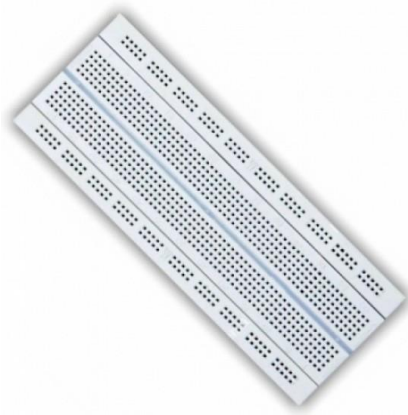
## **Camera Module**



In child safety wearable device, this module acts as a surveillance of the child's surroundings, to get a clearer smart IoT device. It provides parents with the real-time picture of the location, this wearable can also contain a camera location, surrounding temperature, UV radiation index and module incorporated in it.



## **Breadboard**



A breadboard is a widely used tool to design and test circuit. You do not need to solder wires and components to make a circuit while using a bread board. It is easier to mount components & reuse them. Since, components are not soldered you can change your circuit design at any point without any hassle. There are several holes on the plastic box, arranged in a particular fashion. A typical bread board layout consists of two types of regions also called strips. Bus strips and socket strips. It consists of two columns, one for power voltage and other for ground. Socket strips are used to hold most of the components in a circuit. Generally, it consists of two sections each with 5 rows and 64 columns. Every column is electrically connected from inside.

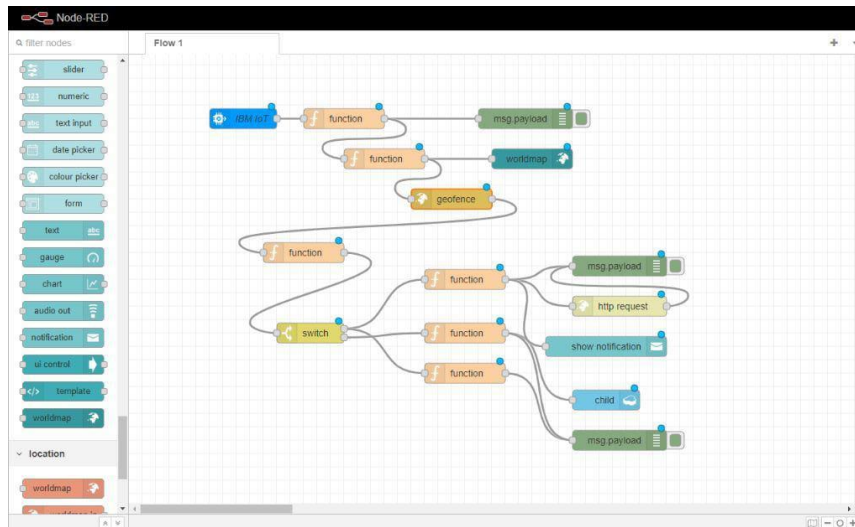
## **NOVELTY / UNIQUENESS**

Along with those features the smart band is also equipped with sensors to monitor the child's health conditions. Heart rate sensor measures pulse rate and BPM. Altimeter detects changes in height and sense whether children are going down a slope or climbing stairs, thereby measuring calorie count.

## **SOCIAL IMPACT / CUSTOMER SATISFACTION**

Impact is the desired long-term change in people's lives. Globally, the expected impact of UNICEF's work on child protection is improved and equitable prevention of and response to violence, abuse, exploitation and neglect of children. This implies a reduction in the prevalence of violence against, and the abuse, exploitation and neglect of children.

## **OUTPUT**



## **BUSINESS MODEL (REVENUE MODEL)**

This device's primary target audience is parents. Considering the device's tracking capability, hardware quality, technology used, and sensors the device rate is made. This type of wearable safety system is critical today and would be a must-have item on the market.

## **CONCLUSION**

The main objective of this proposed model is to track children's safety from violence and health status. As a result, message communication to the proper destination plays a critical role. A significant improvement would be to send the alert message only to their parents and caretakers.