

## CHILD SAFETY WEARABLE DEVICE USING RASPBERRY PI

<sup>1</sup>Arun Francis G, <sup>2</sup>Ramiyadevi K, <sup>2</sup>Janani I, <sup>2</sup>Kavya S, <sup>2</sup>Pavithra R

<sup>1</sup>Assistant professor, <sup>2</sup>Student

Department of Electronics and Communication Engineering,  
Karpagam College of Engineering, Coimbatore-641032.

<sup>1</sup>ja.arunji@gmail.com, <sup>2</sup>ramyadevi.k20@gmail.com, <sup>2</sup>jananiiyappan1@gmail.com,  
<sup>2</sup>kavyasukumar99@gmail.com, <sup>2</sup>pavithrar791@gmail.com

**Abstract:** This project would explore the idea of a children's smart wearable device. This system has the purpose of helping parents to locate their children. There are many wearable devices available for tracking the daily activities of children as well as helping to find a child using the Wi-Fi and Bluetooth capabilities of the app. But Wi-Fi and Bluetooth are proving to be an inefficient means of communication between parent and child. This project focuses on making an SMS text activated to communicate between the wearable child and a parent as the framework for GSM Mobile Communication. The wearable device will respond in real time with a text containing the exact location of a child, which will provide details on the position of the child and the ambient temperature. The new method implemented was using a pi camera to capture the image of a person who is in the opposite position of child. The mail will be send to the parents to track the child location using Raspberry Pi. The pulse sensor is used for monitoring child's pulse rate. The sound sensor is used to differentiate the voice of the child and predict whether the child is in abduction condition. The secondary measure used in this project is the individuals present in the child's surroundings who could respond immediately to the safety of the child until the parents arrive at the place.

**Keywords:** Raspberry Pi, GSM, GPS, Sound sensor, Pulse sensor, Pi camera

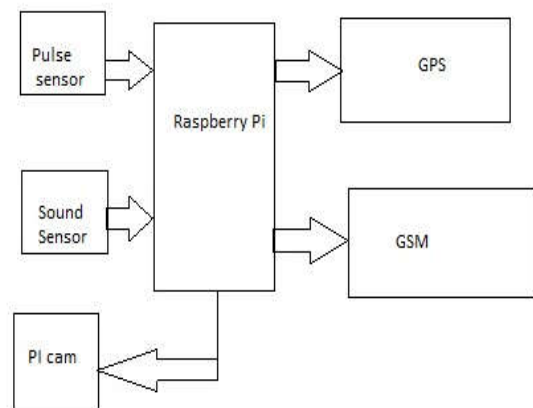
### 1. Introduction

The IoT refers to a collection of tools and structures that are connected to Internet by real world sensors and actuators. The impetus for this system stems from the need for security for young children in these days, as there may be opportunities for the child to be lost in the large crowded areas. The project is to supply safety to child using smart wearable gadget and android application. The reason for this wearable increasing need for protection in young children today since scenarios of the child's loss in big crowded areas could be present. The scheme is based on the key aspect that children can support the missing child and play a significant role in the safety of children until they are reunited with the parents. The device is running the project is the Raspberry Pi3 unit. We are using SMS in this project as a means of communication between the parent and the child's wearable device. The sending and receiving SMS provided by Raspberry Pi3. Pi Camera is used to record the person's image opposite to the child using Image Processing. It is used to track the status of child. The Sound sensor is used to differentiate the sound of child when child is in abduction state. It is predicted with reference values. The pulse sensor is used for monitoring child's pulse rate when child abduction happens.

### 2. Proposed System

To overcome the drawbacks of the existing system. We implement the project using Raspberry Pi. Using Raspberry Pi and Pi camera the child abduction is found. The image processing is done to capture the image of the person who is in opposite direction of child. The pulse sensor differentiates the pulse rate of child and find whether child is in emergency condition. The sound sensor used to predict the voice of child and to help the child to recover from the circumstances.

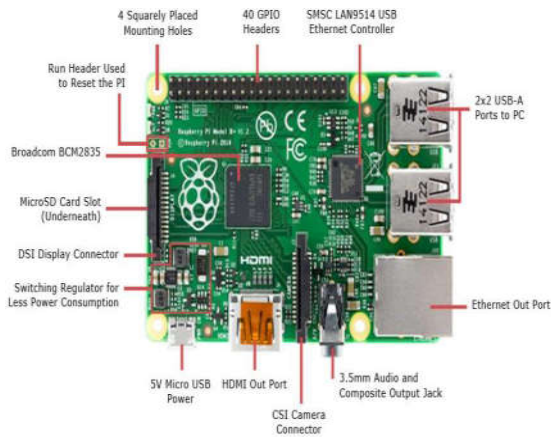
### 3. Block Diagram



Block diagram of a project

### 4. Operation

Raspberry Pi3 collects data of various kinds from various modules that are connected with it. The GSM shield which is used to send the data and it is collected by the Raspberry Pi3 via SMS to the smart phone. GPS Location sensor decides the child's current location. The image is captured using pi camera and it will be sent as a mail to stored mail account. All the sensors use 5v power supply and connected to the Raspberry Pi 3B. This IC microcontroller controls the system with a Raspberry Pi boot-loader. The child's parameters that are recorded by the sensors incorporated within the device are sent to the parent. The pulse sensor senses the pulse rate of child with reference values and predict the condition of child. The Sound Sensor detects the child's sound with reference values. If it exceeds the reference value the condition of the child is predicted.



**5. Materials and Methods**

**RASPBERRY PI:** The system has been designed using Raspberry Pi3, Pulse sensor, Sound sensor, GPS, GSM, Raspberry pi camera. Design of this device consists of Raspberry pi board to which camera, pulse sensor, sound sensor is connected and we are supplying 5V power. Capacitor sensor is used for tapping, based on the input provided by the user authorized person gets the notification via SMS or email. By using this parents can track the children location and ensure safety in real time. The above diagram shows the Circuit connections of the device.

**GSM:** Global Mobile Communications Systems stands for GSM. It has been used for mobile Communication voice and information Service as a wireless cellular technology. GSM is that the foremost generally accepted traditional. GSM can even become a circuit-changed system divided into eight twenty-five rate-slots for each 200 kHz channel. GSM works in many parts of the planet on 900 megacycles a second and 1800 megacycles a second on mobile communication bands. Roaming is to be used in another GSM network via your GSM telephone number. Transmission lines that are designed to carry electromagnetic waves whose wavelengths are shorter than or comparable to the length of the line [8]. GSM compresses the data and then transfers it via a channel of two completely different user data sources, each in its own time frame.



GPS module

**GPS:** The Global Positioning System (GPS) technology may be navigation system mainly based on satellites. To military, civilian and business users around the world, the system provides essential information, which is free of charge for anyone with GPS receivers. GPS acts on a receptor everywhere in the weather conditions to measure the 2nd location (Level and Length) and the track movements on the signal with a minimum of three satellites. It interfaces with Raspberry Pi via USB port, typically has 45mA and compatible protocol NMEA-0183 protocol. The operation of this varies from -40oC to 85oC, and the area unit of latitude and large circular values is derived from NMEA.



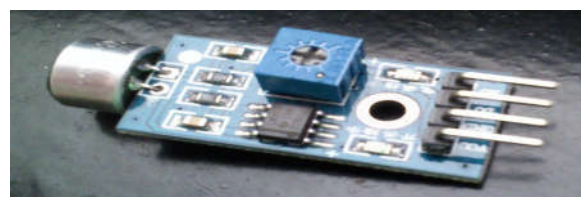
GPS module

**PULSE SENSOR:** Amped is also a heart rate monitoring plug and play. It is used by artists, students, athletes, manufacturers and international game and mobile developer’s agency to easily include live cardiac data. Pulse detector provides the system with amplification and sound isolation devices.



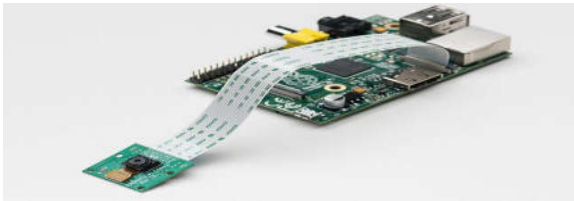
Pulse sensor

**SOUND SENSOR:** The module provides a visual sound and usually is used in the intensity of the sound of the police investigation. This module may be used for security applications. The simplest manner to cut back miss rate is to increase the block size [9]. The transducer provides the data needed for electronic devices, peak detector and buffer in the nourishing equipment. When a sensor element detects a sound, it processes the signal voltage that is transmitted to a Raspberry Pi3 and then performs the process required.



Sound sensor

**PI CAMERA:** Raspberry pi camera module is a camera module which is used in this document. The camera module on the Raspberry Pi plug in to the CSI connector. A simple picture of the image or 1080p HD video recording at 30 fps. A dedicated 15-pin Camera Serial Interface (CSI), designed specifically for cameras interface, is connected to the Raspberry Pi through the camera module. The CSI bus provides high data rates and only transmits data of pixels to the BCM2835 processor.



Pi camera

## 6. Results and Discussions

### PULSE SENSOR OUTPUT

```

pi@raspberrypi:~$ 
pi@raspberrypi:~$ python heartBeatsPulseSensorAlgo.py
BPM: 109
BPM: 114
no beats found
no beats found
BPM: 45
BPM: 45
BPM: 46
BPM: 48
BPM: 50
BPM: 53
BPM: 55
BPM: 58
BPM: 61
BPM: 65
BPM: 69
BPM: 74
BPM: 74
BPM: 75
BPM: 75
BPM: 76
BPM: 75
BPM: 75
BPM: 75
BPM: 76
BPM: 76
BPM: 75
BPM: 75

```

### GPS OUTPUT

```

pi@raspberrypi:~$ python gps7.py
Latitude= 15.8658
Longitude= 74.5339
Latitude= 15.8658
Longitude= 74.5339
Latitude= 15.8658
Longitude= 74.5339

```

## 7. Conclusion

The objective behind the project is to design and manufacture a functionality that is also lightweight in itself, providing the advantage the private security system as an emergency response device that is useful to children in crime incidents. This paper offers the result for the parent in 2 alternative ways. The first one is that they get associate degree alert message (SMS) for the registered signal. Subsequent one is exploitation pi camera, the image processing is completed of capture the image of the person within the other way of the child. From this captured image the notifications area unit sent to the parents and that they will find their child in essential state. By this device we are able to avoid violence against their children.

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