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# Design of Wearable Safety Device

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## ABSTRACT

*This paper discusses the concept of a safety wearable device for individuals. The major advantage of this wearable over other wearables is that it can be accessed by any cell phone and doesn't necessarily require an expensive Smartphone and not a very tech savvy individual to operate. The purpose of this device is to help the individual locate at time of distress with ease. At the moment there are many wearables in the market which help track the daily activity of the user/individual and also help find them using Wi-Fi and Bluetooth services present on the device. But Wi-Fi or Bluetooth appear to be an unreliable medium of communication between the users. Therefore, the focus of this paper is to have an SMS text enabled communication medium between the individual's wearable and the receiver as the environment for GSM mobile communication is almost present everywhere. The user can send a text with specific keywords such as "LOCATION" "TEMPERATURE" "PULSE RATE", the wearable device will send a text containing the real time accurate location of the user using GPS Module which upon tapping will provide directions to the user's location on Google maps app and will also provide the body temperature, Pulse Rate so that the receiver can keep track of the Temperature or Pulse Rate is not suitable for the user.*

***Keywords:*** *Arduino, Wearable, Location, GSM, Temperature, Pulse Rate*

## I. INTRODUCTION

The motivation for this wearable comes from the increasing need for safety of every individual as there could be scenarios of distress. This paper focuses on the fact that any individual in trouble can be helped by the people around and play significant role in ensuring every person's safety.Most of the wearables today are mainly focused on location etc via Wi-Fi and Bluetooth. But Wi-Fi and Bluetooth seem a very unreliable source to transfer information. Therefore it is intended to use SMS as mode of communication in the wearable device, as this has fewer chance of failing compared to Wi-Fi and Bluetooth.The platform on which this project will be running on is using an Arduino Uno microcontroller board based on the ATMega328P, and the functions of sending and receiving messages is done by using GSM 800C which uses the GSM network. And the location of the user is tracked with aGPS Module that is used is SIM 28M GPS Module with its antenna. The receiver gets a SMS on the location of the user which can be used to track them down with the pinpoint location details provided. The secondary features that are equipped are the Pulse Rate sensor which when programmed with the arduino Uno gives the exact health condition of the user to the receiver on the other end in the form of a SMS.Therefore giving the exact health conditions of the individual so that they can prepare themselves for future measures. Additionally the wearable comes equipped with a thermistor which sends the body temperature which determines the health condition of the user at times.So ofthe existing work done on these similar lines are examples for a wearable vest which senses and provides hazardous danger and gives information about the user in an accurate way. It is based on a multisensor arduino system and low power Bluetooth module.

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## II. RELATED WORK

2.1 Orlando Pereira, et al (2010) [1] proves the theory of using body sensors by using Network mobile solutions for biofeedback monitoring. The SHIMMER firmware and Bluetooth firmware has been implemented in this work. The limitations of this work are Bluetooth should be always connected to phone; it cannot be used if phone is lost.

2.2 MirjamJutila, et al (2014) [2] proves the new concept of a wearable sensor vest for children. Safety vest Design, Gateway Implementation, Sensor web elements has been implemented in this work. The limitations of this work is the device used is very big in size, it cannot be carried to places all can go.

2.3 Samuel Tanga (2016) [3] proves the concept of sensors in his work "Development of Prototype Smart Home Intelligent Lighting Control Architecture Using Sensors Onboard a Mobile Computing System". "Luminaire controlled by the Arduino microcontroller" has been implemented. The limitations of this concept are Wi-Fi or internet is needed to work the application.

## III. PROPOSED WORK

### 3.1 Block Diagram

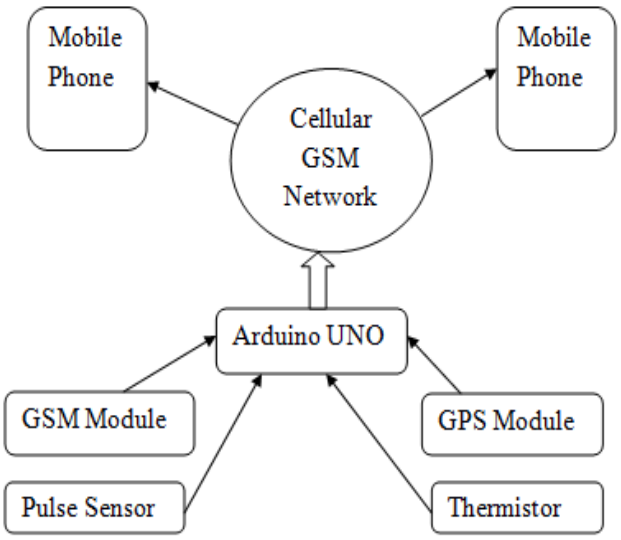


**Fig 3.1: Block Diagram**

The Wearable Device consists of GSM, GPS, Pulse Sensor and Thermistor.GPS is used to detect the Latitude and Longitude of any location on the Earth, with exact UTC time. GSM is a mobile communication modem. We will use GSM in order to send the coordinates that we receive from the GPS Module to the user who will receive the message. The Pulse Sensor gets data in BPM and the Thermistor gives the details of the temperature in Celsius or Fahrenheit as required.

### 3.2 Working of GPS and GSM modules

GPS (Global Positioning System) is used to detect the Latitude and Longitude of any location on the Earth, with exact UTC time (Universal Time Coordinated). This device receives the coordinates from the satellite for each and every second, with time and date. GSM is a mobile communication modem; it stands for Global System for Mobile Communication (GSM). It was created to describe the protocols for second-generation (2G) digital cellular networks used by mobile phones. We will use GSM in order to send the coordinates that we can receive from the GPS Module to the user who will receive the message.

### 3.3 Pulse Rate Sensor

Pulse Rate means nothing but the Heart rate at which the heart contrasts and expands while pumping blood. The average Heartbeat range for human is 72 per minute, if Heartbeat rate is too low it means there may be any bad health condition, high heart beat rate, then there is a big tension faced by the victims. When the Emergency button is pressed then the exact Pulse Rate of the user is measured and sent to the Microcontroller which further sends the message containing this details to the pre saved mobile numbers, this process takes place via GSM module.

## IV. FIGURES AND TABLES

### 4.1 SCHEMATIC DIAGRAM

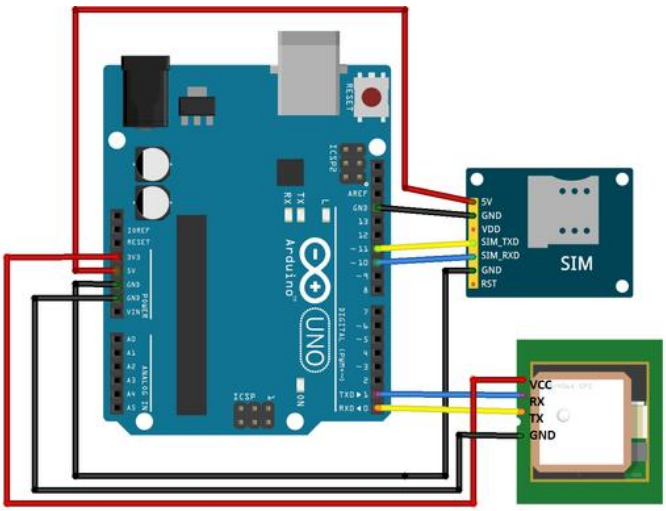


**Fig 4.1:Interface of Arduino with GSM and GPS modules**

### 4.2 HARDWARE SETUP

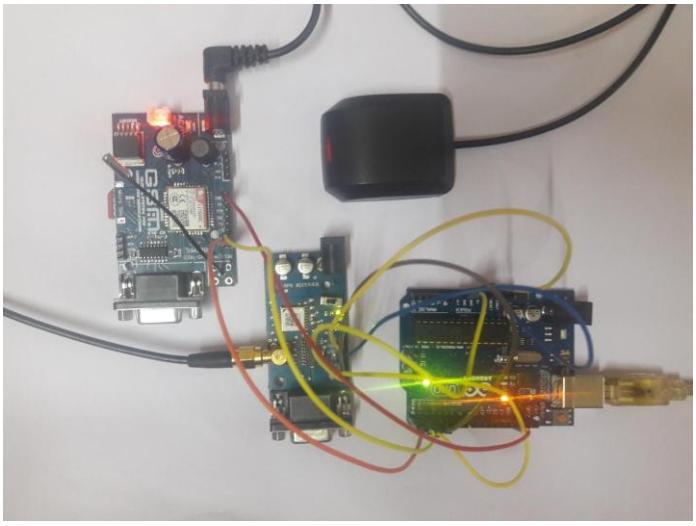

**Fig 4.2:Interface of GSM and GPS with Arduino**

The Hardware setup is shown in the above figure for GSM and GPS testing. GPS module has its antenna

connected to it. And a SIM Card must be inserted in the GSM to send the text messages. The GSM and GPS modules are connected to the Arduino and a specific code is uploaded to the Arduino with the help of which both modules do the required operation. The GPS collects the Location data of the user and sends it to the Arduino which is sent as a text message in the more user understandable format i.e. a Google Maps link which gives the information just by clicking on the link. The result is shown in the Fig 4.4.

### 4.3 HARDWARE AND SOFTWARE REQUIREMENT

| HARDWARE REQUIREMENT | SOFTWARE REQUIREMENT |
|---|---|
| 1. Microcontroller- Arduino Uno<br>2. GSM Module- SIM800C<br>3. GPS Location Sensor - SIM28M<br>4. Temperature Sensor<br>5. Pulse Sensor | 1. Arduino IDE |

### 4.4 RESULT OF ARDUINO INTERFACE WITH GSM AND GPS MODULES

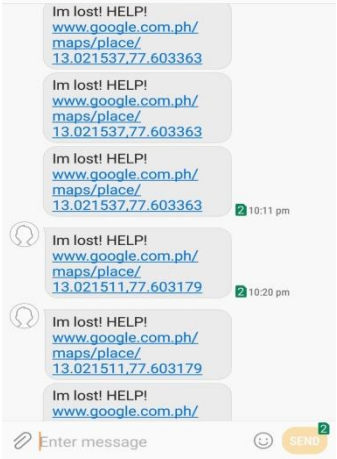


**Fig.4.4:Text message with the Location details of the user**

## V. CONCLUSION

As mentioned above a safety device which is for women and children mainly, can be carried anywhere. The device has a Microcontroller which is interfaced with GPS, GSM, Pulse Rate Sensor and Thermistor to get the required data.This may help the user when there is any emergency. The GPS sends the location coordinates through GSMas a text message when the emergency button is pressed to the nearby police station and relatives by tracking their location. And also it sends the information of user's Pulse Rate and Body Temperature.

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