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# CHILD SAFETY WEARABLE DEVICE

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**Abstract:** The primary purpose of study is that we develop a Messages empowered transmission means among parent and device, because GSM mobile network is ubiquitous. The caretaker can initiate interaction using specific words such as "heartbeat""oxygen level" etc., gadget will response, containing the current position of the user, after clicking it will display route of the user's spot and will display environment temperature, heartbeat level, oxygen level, uv index so that the parents can monitor child. The wearable will include an oxygen level sensor, temperature sensor, heart rate sensor, GSM, GPS, and Arduino Nano. The guardian receives regular updates on the child's heart rate via the heartbeat sensor. Secondary measures included the device is bright light and warning buzzer. When the parents activate the device via messege text, it should prominently show light signal as well as make noise to alert people standing nearby user and will help them.

**Keyword:-**Wearable, IOT, Arduino Nano, GSM, GPS, Sensors.

## I. INTRODUCTION:-

IOT [1] is a network which contains devices which communicate with input and output device over net. This include wearable gadgets [2], home automation systems [3], as well as cellphones, which are increasingly being used to measure their surroundings. This study emphasizes that the critical feature that lost child may need help by everyone around them and play a crucial part in the child's safety until they are find their relatives. Many wearables on the market, are designed to send parents information about their child's location, activity, and other details via Wi-Fi [4] and Bluetooth [5]. However, this both appear to be exceedingly limited data transfer protocols. Because SMS has a lower failure rate than this both, it is used as interaction medium among caretaker and user. This project will be built on the Arduino platform, with the GSM utilizing the GSM network to transmit messseges, make and receive calls, and connect to the net [6]. In addition, various modules are utilized to send parents an SMS with the child's current location. The second thing proposed is an SOS Light indicator, which is programmed using an Arduino nano to display the signal. If a child is lost, caretaker can transmit messege to device, in turn it will trigger wearable's light. As a result, the SOS signal warns everyone surrounding the child that it might need help. In Addition, it contains a buzzer, it can be activated via giving message phrase "buzz" to it. As a

result, the buzzer is loud enough for the parent to hear from a long-distance away.

Parents can also receive accurate coordinates for their child via SMS, which will assist them in locating them. The primary idea behind this is to monitors user's wellbeing and serve as a safeguard. As soon as button is pressed, device sends message to caregiver, along with a current direction. It develop a safeguard device capable of detecting and delivering warning messages while also monitoring heart rate, SpO<sub>2</sub>, and temperature and providing timely data.

## II. LITERATURE REVIEW

- The first study presents a heart supervising device using Lily pad and GSM modules. It sends alerts to designated contacts when abnormal heart rate conditions are detected.[7]
- The second study introduces a smart device, which enables parents into tracking their child's location, temperature, and UV exposure through SMS communication. Parents can request specific information, such as location or temperature, and receive updates on their child's surroundings.[8]
- An IoT device tracks patients' precise locations using GPS, benefiting healthcare and other applications like animal tracking.[9]
- A pulse oximeter prototype is designed to continuously monitor heart rate and oxygen levels.[10]
- A personal safety device is proposed, featuring location tracking, notification sending, and a self-defense mechanism that delivers a brief electric shock.[11]
- "FEMME" is a 24/7 protection device that sends location alerts to the police in emergency situations.[12]
- An IoT gadget uses fingerprint recognition to detect emergencies and automatically alerts nearby individuals and authorities if no signal is received within a minute.[13]

## III. METHODOLOGY

Arduino Nano, is a system's main component. Every sensor is connected to it. It can perform following functions when programmed with the Arduino IDE and the C++ language.

### 3.1 System Overview:-

When the Arduino GSM shield activates the GPS module, for example, the Nano gathers data from the sensors connected to it. The Arduino nano gets data and sends it via SMS using the GSM .Upon recieving the data Arduino

nano processes it and sends to GSM , in turn transmits to registered no. by message. By just touching on the coordinates, the user can view the distance between them and the child.

### 3.2 Notify the caregiver by SMS when the panic button is touched.

The Arduino contains a panic button that, when hit, causes the Nano to use the GPS module to retrieve the current GPS location and transmit location to number via message. Additionally, an automatic system will contact the caregiver.

### 3.3 Timely notification about heartbeat, oxygen, and environment temperature.

The Nano includes sensor, which analyzes the child's heartbeat and oxygen levels, delivers in foto the device frequently. Nano then processes the information. It utilizes the GSM and send regular notification to caregiver.

### 3.4 Temperature Sensor.

The temperature of the child's immediate surroundings is determined using it.

### 3.5 Heart Rate and SpO2 Sensor.

This sensors are used to measure heartbeat level and oxygen level. Additionally, there is programmable pin. This gadget's power source is 3.3V.

### 3.6 GPS.

The gadget's GPS transmits user's direction to the caretaker. When the panic button is clicked, then current location of device or the child is transmitted to registered phone.

### 3.7 GSM

It monitors messages. It work same asmobile, like sending the sms text, make calls, connect to net etc. When panic button is touched, the registered phone receives a text message and direction. This module enables nano to deliver caregiver SMS updates on a regular basis.

### 3.8 Arduino Nano

The AT mega 328 (Nano R3) serves as the foundation for the Nano Arduino's tiny, feature-rich, microcontroller and breadboard-friendly design .Features 32kB of flash memory, 8 analogue inputs, a 16 MHz clock speed.

### 3.9 UV sensor

It measures amount of uv radiation present in user's surroundings. The sensor is based upon GUVVA-SI2D sensor, which has a range: 200-400 nm. The electrical signal emitted by the sensor varies based on the UV intensity.

### 3.10 SOS Light.

By blinking common light signal, people now recognize as a call for help, the SOS light alerts anybody nearby that the youngster may be in danger. The parent can start this process by texting the child's wearable with the keyword "SOS," which will cause the SOS light to flash.

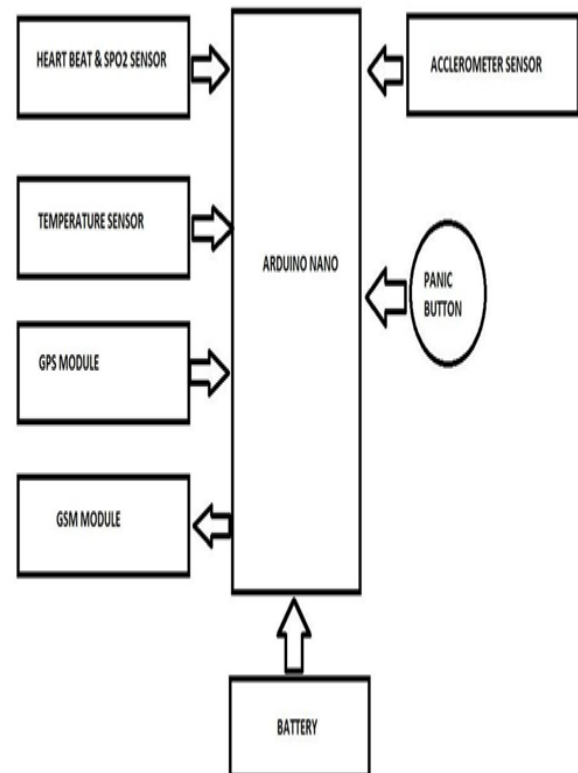
### 3.11 Distress alarm Buzzer

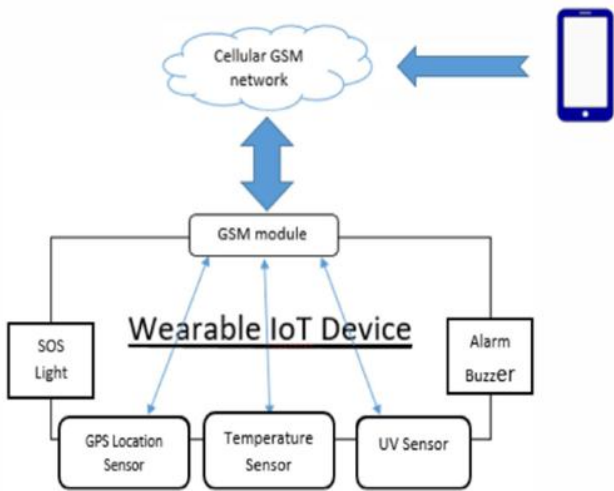
Sending an SMS text from a cell phone with the term "BUZZ" activates the Grove buzzer module. Additionally, this buzzer functions similarly to the SOS by warning everyone in the vicinity that the youngster may be lost and in need of help by using a distressed tone.

### 3.12 Arduino GSM shield

The parent's cellphone has been set up to send SMS messages to the GSM shield. It will continuously check the messages for Keyword. If received text message does not contain any keywords mentioned above, it will destroy the message and provide no response to the sender. First argument for using GSM module as Bluetooth connection mechanism is because the wearable is intended to be useable by anybody with a cellphone, not only those with high-end handsets.

### 3.13 Block diagram:-



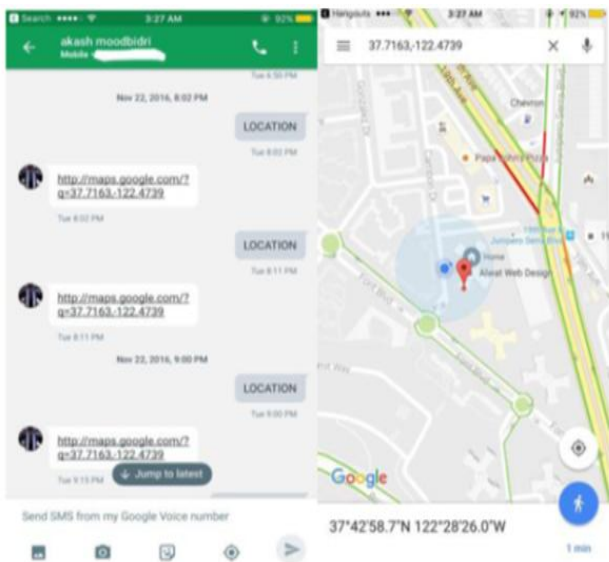


**Fig 1. System Design**

**IV. RESULTS AND DISCUSSION**

**4.1 GPS Location Sensor:-**

The wearable gadget was repeatedly tested using SMS messaging. The GPS location sensor on the user's cellphone detected the wearable device's exact latitude and longitude coordinates. The user then clicked on URL supplied to them, in turn it launched the Google Maps program and displayed their exact location.

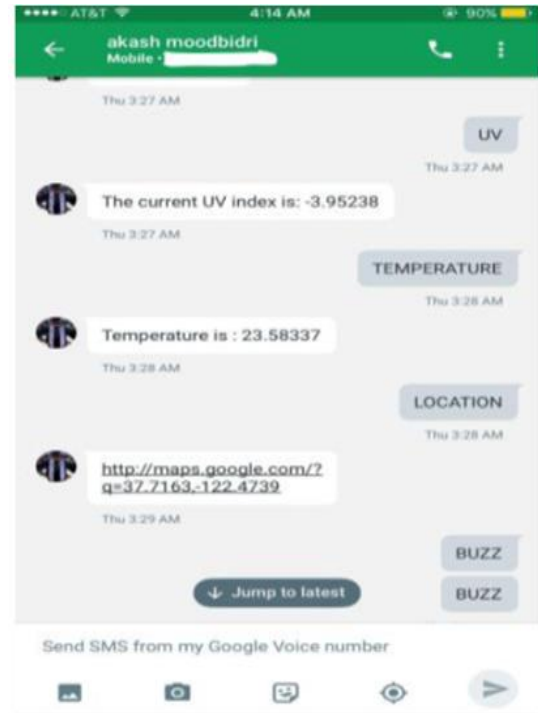


**Fig 2. Left: SMS displaying LOCATION and Google maps.**

**4.2 Temperature Sensor and UV Sensor:-**

Like the GPS position sensor, it was tested repeatedly in different temperatures and degrees of sunrays intensity. During test, both sensors performed admirably. It took less

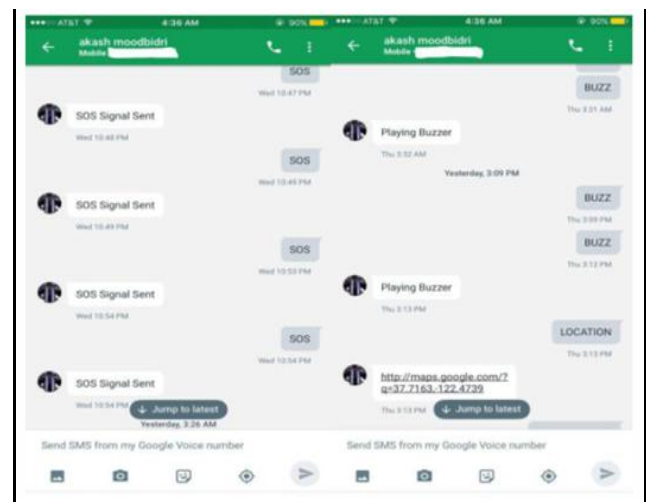
than a minute for the keywords "temperature" and "uv" to generate result.



**Fig 3. SMS displaying UV and Temperature.**

**4.3 SOS Light and Distress Alarm Buzzer:-**

This on SMS trigger mechanism differ from those on the sensors indicated above, transmitting an SMS with specific keyword. Light starts flashing continuously and buzzer makes loud sound so that nearby standing people get alert.



**Fig 4. SMS: Light and buzzer.**

#### 4.4 Spo2 sensor:-

The sensor examines the user's heart rate and SpO2 using a max30100 sensor that sends data to the Nano for processing on a regular basis. Nano utilizes GSM and send regular SMS notification to no.



**Fig.5 App screen for Spo2 sensor**

#### V. CONCLUSION

The wearable child safety device can also operate as an intelligent IoT device. Parents can use the Current location, heartbeat, oxygen level, uv index, temperature, light and buzzer to find child or alert onlookers to take action to rescue or soothe them. Future advancements to the smart child safety garment can be produced using extremely small Arduino (LilyPad Arduino), which can be sewn onto Clothes. In addition, a high-efficient model capable of storing battery for more period of time can be developed. The proposed system outperformed existing efforts in the literature in terms of accuracy. There is room to expand the biofeedback parameters and reduce the device's size to make it more user-friendly.

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