

R.O.H-The Ultimate Device for Your Safety and Security

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Abstract

In view of our country's current situation, and taking into account the events that have taken place over the past few years, people's safety, is at stake. This paper proposes a reliable, lightweight, and cost-effective solution. The main aim of our paper is to provide immediate help and safety, for the welfare of people. At anytime if an individual feels he/she is in danger, then they just have to press the button of the compact device mounted on a wrist band. If the unit is triggered, it starts monitoring the person's current location with the aid of a Global Positioning System and sends a warning message to the already registered mobile numbers via Global System for Mobile communication and, hence to the cops. It also has a camera installed and a buzzer that makes the device stand out.

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1. Introduction

The news accounts almost every day of ghastly killings, rapes, sensational robberies and kidnappings. Of course, the crime graph is on the rise dramatically. According to the latest statistics around 42,678 cases of murder, 3,59,849 cases of crime against women and over 88,000 cases of kidnapping of people, get registered every year. Apart from these many of the cases are unregistered. Security is a significant problem that prevents an individual from progressing in the society in terms employment or just living their lives liberally. Living in a society surrounded by such crimes has become a threat to life and freedom. In certain countries, it is legal to use of self-defence devices like pepper-spray and stun guns. These are intended for people to protect themselves by fighting back the opponent, but if the victim happens to be in a remote area with nobody to assist, then these are considered as temporary assistance. We all sometimes take a fall or end up in situations where there is a serious need for help. Whether it's while travelling or walking through the streets alone at night, not every time our friends or family will be around us. While we wish it

were possible to bring someone along all the time, it is unfortunately very unlikely considering everyone has their own life and activities to do. A protection tool can be a real game-changer in such situations. This is when R.O.H enters the frame. This paper proposes a mechanism to respond quickly which helps in trouble. R.O.H is a personal security device built using IoT, to ensure that you and your friends are secure 24/7. It is packed with real emergencies features, making it an ideal device for all.

2. Existing Systems

Several safety devices with various sensors and microcontrollers have been built such as 'Self Defence Device' [1] with a fundamental approach to report the current location with an alert message to the already set numbers and to the cops using GPS and GSM via a fingerprint login to access the device. The drawback of this device is, if the fingerprint of the user is not sensed correctly due to dirt or sweat on the finger, then the user will not be able to access the device. Moreover, the fingerprint login is not necessary for an emergent situation.

The authors of 'ProTech' [2] have proposed a safety system with GSM to transmit a message in real-time to the cell phone, as well as for calling. Raspberry Pi has a connection with GPS to give the user's location coordinates. Upon pressing, a button that is in connection to trigger the buzzer, nerve stimulator and camera. An Android program is used to trigger SMS and call. Ultimately, it uploads the status from the Raspberry Pi to server for storing it. Drawbacks: It cannot be used as a wearable tool. It is not compact and lightweight so it will be difficult to carry around. It does not have options for entering multiple pre-set phone numbers according to the user's choice.

The authors of [3] have incorporated the above basic features. However, the future scope of this device is to make it more compact so that it easily fit within items like watch, garments, handbags or jewellery, so that the attacker cannot notice it. GSM and GPS modules having their own SIM can replace cell data, is another future scope mentioned by the authors.

The 'SMARISA' smart ring [4] is comprised of a push button, buzzer, camera and RaspberryPi Nano. When in danger, the user can press the button triggering the Raspberry Pi Nano that causes the camera to record the incident's image. The user can log into an Android application that is developed for the ring, which allows to pick a contact or add a new contact the user wants to connect with. Drawbacks: There is no provision for preset phone numbers to make a quick dial; also, the device is not very compact to be worn on a finger.

3. Proposed System

We aim to have the easiest and simplest way of contacting for support. The unit is small and mounted on a brace of wrists. This allows the victim to press the button that is on the device quickly. Because it is a wearable tool, the person at risk can reach and access it effortlessly and quickly with a single click. This approach is much preferred rather than fumbling with a mobile phone and trying to open various applications to contact parents or the police. This safety wrist band's primary objective is to monitor the current location and a distress alert to cops and pre-set numbers using GSM and GPS modules so that an unexpected event can be hindered. The system is fitted with a buzzer that produces a loud disturbing sound good enough to attract the attention of nearby people for help. It can also broadcast the incident video live. This will help the police department minimize the violence against humankind and it can use the evidence to investigate the crime. Using the following components these features can be integrated into the system.

A. Hardware Specifications

Battery and Power Supply: A battery of 3.7V LiPo 500mAH(4units) is used, and the microcontroller is powered by a +5.1V micro USB supply.

Push Button: Once the pushbutton is pressed, the signal is transmitted to the raspberry pi, and the microcontroller reports the GPS coordinates to the preset numbers via GSM.

Microcontroller: Raspberry Pi 3, with 64-bit CPU, 1 GB RAM Quad-Core and 1.2GHz Broadcom. Furthermore, it includes 40-pin extended GPIO, 4 USB 2.0 ports along with 4 pole stereo output and composite video input, full-size HDMI, a camera input for linking the Raspberry Pi camera, micro SD port for installing and processing the operating system.

GPS Module(NEO-6M): Global Positioning System (GPS) provides any device's current date, time, longitude, latitude, distance, and direction and other statistics. With the assistance of the built-in 3V-5V converter unit it is interfaced with normal 5V Microcontrollers. It is made up of 4 Pins. These include 5V, RX, TX, and GND.

GSM Module (SIM800L): GSM is a digital mobile communications system that stands for Global Mobile Communication System. It supports Quad-bandDCS1800, GSM850, PCS1900, and EGSM900, it can link to any 2 G SIM, Send and receive GPRS data to any global GSM network, search and receive FM radio broadcasts and much more. SIM800 is GSM / GPRS compliant. It could be used to browse the web and to communicate through SMS and phone calls. It has a slot for a SIM card that must be placed on the module's outer wall. The component operates with a voltage range of 3.4 to 4.5 V.

Buzzer: A small alarm that produces a sharp noise, loud enough to alert people within the locality.

Camera: For live streaming with audio and video capturing, we shall install the Raspberry Pie zero camera.

B. Software Specifications

Raspbian OS: This is an operating system based upon Debian operated on Raspberry Pi. It is a versatile operating system with outstanding desktop environment. The Raspberry Pi is linked to the device by VNC client, and perhaps the code is examined on the Raspbian OS. Node-Red, Chromium, Nano and Vim were the main tools used.

Google Maps API: The Interface marks the specific coordinates on the map remnant with a tag. This tag assists to identify the user's location on the map, which points to the location received from the GPS.

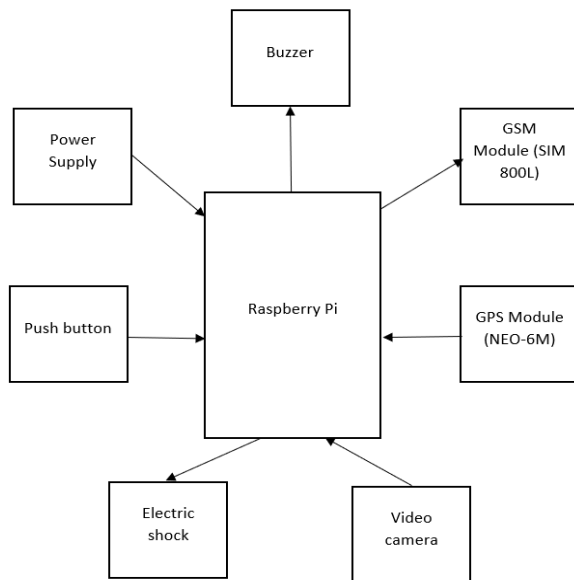


Figure 1: Block Diagram of the Security Device- R.O.H

4. Methodology

The primary target of our paper is to provide aid to people in particularly dangerous circumstances. This system is made up of a key or a button. When the switch is pressed by the person in risk, the system is turned on and the microcontroller is triggered and receives the current latitude and longitude coordinates of the position of the person using the GPS (Neo-6 M) module.

An SMS that conveys a distress message including the location extracted from the GPS module would be sent to all preset contact numbers with the aid of GSM (SIM800L) module. The GSM reports the exact location every 10 seconds so even if the perpetrator is constantly changing the location, the latest location at that time can be easily detected by the authorities.

The buzzer in the system is turned on so that the people nearby could indeed perceive a chaotic situation and come to the aid. Electric shock is also emitted as a self-defense mechanism against the attacker. This helps the victim to have some time to attempt to flee, as the attacker will be startled by the electric shock. The flowchart of the step by step working mechanism of the device is shown below.

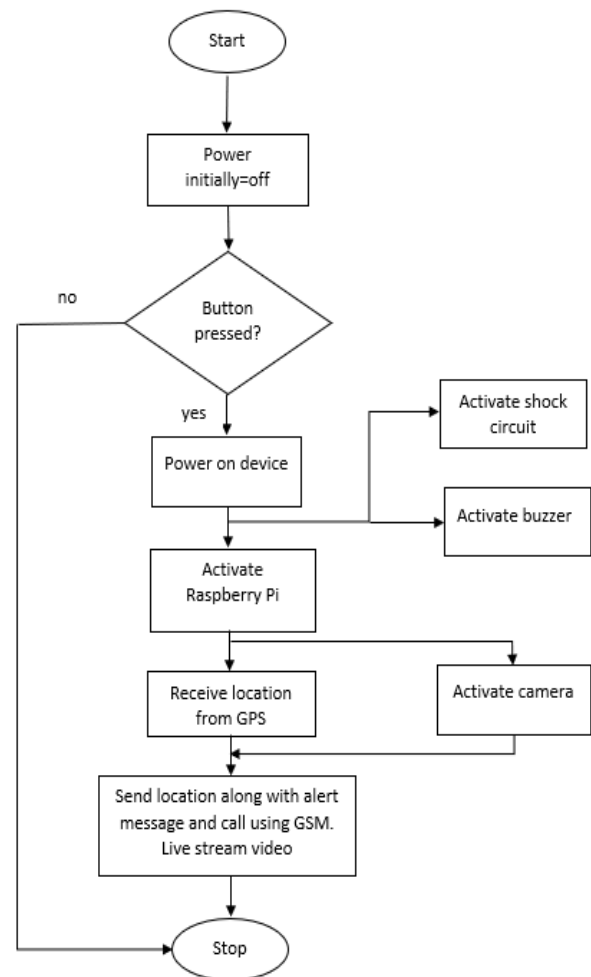


Figure 2: Flowchart for the working of R.O.H

5. Result

When the push button is pressed, the device will be turned on, and a loud alarming sound is produced by the buzzer. The electric shock is produced immediately. GPS (Neo-6M) finds the GPS location of the victim, and then it will send a message to the parents and police stating, "I'M IN DANGER!! NEED HELP" along with the location by using GSM (SIM800L). It keeps track of the GPS position every 10 seconds. The Google Interface can show a direct coordinate value on the map in the form of a tag. This tag will provide the current latitude and longitude coordinates of the area, and it will be sent as an SMS attachment. Clicking on the link will take you to google maps.

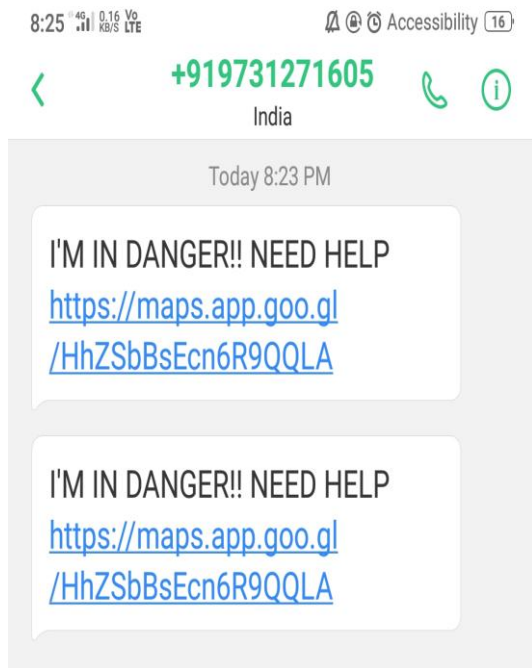


Figure 3: Text messages with location link received from victim

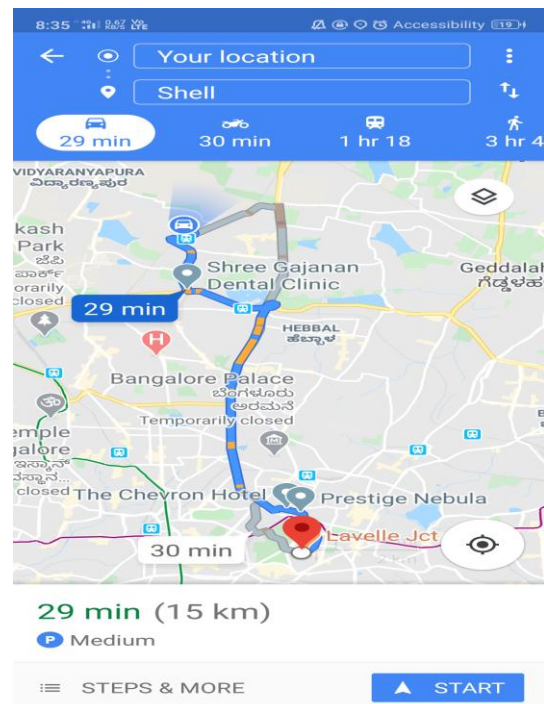


Figure 5: Directions to the victim's location is available

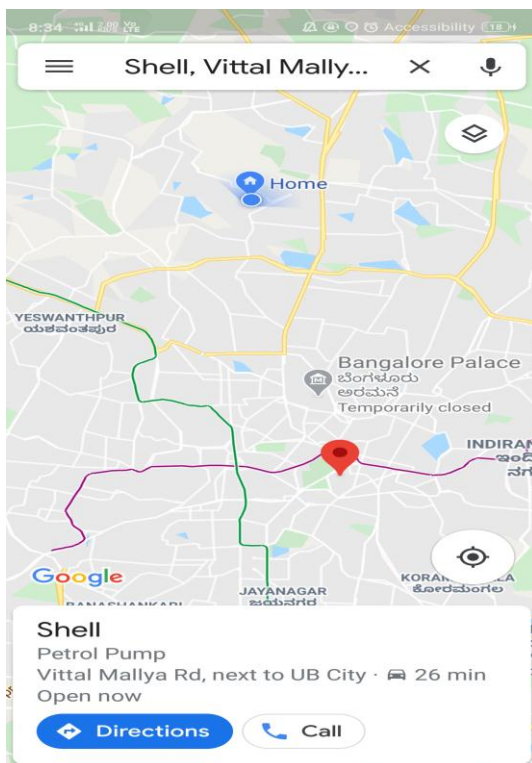


Figure 4: Link redirects to Google Maps

6. Future Scope

1. This device can be made more compact.
2. Child lock feature can be added for children.
3. A more sophisticated self-defence mechanism can be incorporated.
4. Implementation of algorithms of cab and food services to find the nearest facility available the same as to find and send signals to police stations and mobile cop services.

7. Applications

- **Protection from danger:** The main objective of our paper is to overcome or feel safer in dangerous situations.
- **Investigation:** The device can also be used for investigation purposes due to the inclusion of striking features such as spy camera and GPS location tracker.
- **Kids:** Parents often worry about the safety of their children; thus, this device can be beneficial to overcome their worries and fears.
- **Lost and found:** This device comes in hand to look/search for other valuable items (laptops, vehicles, etc.).
- **Research:** The device can also be quite helpful in the research and discovery departments.

8. Conclusion

The proposed design is an all-in-one system to help users in dangerous situations. It is compact and easy to handle. The tool can track the target area in real time with acceptable precision. This can be used as an important and necessary resource to help anyone at risk, and thereby

to minimize crime around them. Fear of being attacked makes people feel discouraged to prosper in various aspects of life. This paper is to build a self-defence system for welfare of all people, to defend themselves from any sort of physical harassment. We hope our device will help people in the everyday aspect of their daily life.

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References

- [1] Shaista Khanam, Trupti Shah, "Self Defence Device with GSM alert and GPS tracking with fingerprint verification for women safety", Third International Conference on Electronics Communication and Aerospace Technology (ICECA 2019), ISBN: 978-1-7281-0167-5.
- [2] Trisha Sen, Arpita Dutta, Shubham Singh, Vaegae Naveen Kumar, "ProTecht – Implementation of an IoT based 3 –Way Women Safety Device", Third International Conference on Electronics Communication and Aerospace Technology (ICECA), 2019, IEEE Xplore ISBN: 978-1-7281-0167-5.
- [3] Utsav Rai, Kashish Miglani, Aman Saha, Bismita Sahoo, Vergin Raja Sarobin M, "ReachOut Smart Safety Device", 2018, ISBN:978-1-5386-7050-7.
- [4] Navya R Sogi, Priya Chatterjee, Nethra U, Suma V, "SMARISA: A Raspberry Pi based Smart Ring for Women Safety Using IoT", 2018, International Conference on Inventive Research in Computing Applications (ICIRCA), 2018, ISBN:978-1-5386-2456-2.
- [5] Prof. S. A. Bankar, Kedar Basatwar, Priti Divekar, Parbani Sinha, Harsh Gupta, "Foot Device for Women Security", Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018) IEEE Xplore Compliant Part Number: CFP18K74-ART; ISBN:978-1-5386-2842-3.
- [6] Prof. Sunil K Punjabi, Prof. Suvarna Chaure, Prof. Ujwala Ravale, Prof. Deepti Reddy, "Smart Intelligent System for Women and Child Security", 2018 IEEE, 978-1-5386-7266-2.
- [7] Muskan, Teena Khandelwal, Manisha Khandelwal, Purnendu Shekhar Pandey, "Women Safety Device Designed using IoT and Machine Learning", IEEE SmartWorld, 2018.
- [8] Helen A, M. Fathima Fathila, R. Rijwana, Kalaiselvi. V.K.G, "A Smart Watch for the Women Security based on IOT concept-WATCH ME", 2017 IEEE, 978-1-5090-6221-8.
- [9] Sharifa Rania Mahmud, Jannatul Maowa, Ferry Wahyu Wibowo, "Women Empowerment: One Stop Solution for Women", 2017 2nd International Conferences on Information Technology, Information Systems and Electrical Engineering (ICITISEE), 978-1-5386-0658-2.
- [10] Nandita Viswanath, Naga Vaishnavi, Pakyala, Dr. G. Muneeswari, "Smart Foot Device for Women Safety", 2016 IEEE Region 10 Symposium (TENSYP), 978-1-5090-0931-2.
- [11] Harikiran, Karthik Menasinkai, Suhas Shirol, "Smart security solution using internet of things", (ICEEOT-2016), 978-1-4673-9939-5.
- [12] Madhura Mahajan, KTV Reddy, Manita Rajput, "Design and Implementation of a Rescue System for Safety of Women", IEEE WiSPNET 2016 conference, 978-1-4673-9338-6.
- [13] Glenison Toney, Dr Fathima Jabeen, Puneeth S, "Design and Implementation of Safety Armband for Women and Children using ARM7", 2015, 978-1-4799-8371-1.