

# Women Safety Devices and Applications

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**Abstract:** Women safety has been a big concern and it has been the most important duty of every person. There is no chance of the welfare of the world unless the condition of the women is improved. Since the ancient time, women are given most respected place in the society but every day and every minute some women of all walks of life (women, girls and babies) are getting harassed, molested, assaulted and violated at various places all over the world. It is estimated that 35% of the women have experienced physical and/or sexual violence at some point in their lives. This paper includes various ideologies and methodologies of numerous authors who have reviewed multiple applications and devices using present technologies and processors and they have also upgraded these with certain requirements in order to decrease violence against women. Also a small measure of improvement proposed in this paper, adds to the better performance of these devices and lead to better women safety.

**Keywords—** Two Parameter Physiological Sensing Systems, Healthcare, PCG and ECG.

## 1. INTRODUCTION

This paper involves few precautionary devices and applications in order to prevent or avoid the problems faced by women. It is not only about prevention, but it also helps the women deal with the problems faced in the past and achieve fair justification and morality in the society. The safety and security of a woman can never be at rest, no matter what new device is on the market or no matter how nice a new application is made, there always can be something added to it. There cannot be a cop always guarding a woman, but there can be secret safety measures with them which can be easily used at the time of threat and let the nearby people know that there is something bad happening and their support is need. By keeping all these things in mind many safety devices have been made and few of them are discussed in this paper.

### Literature

The paper [1] proposes a safety device and application called FEMME using ARM controller. It is a security device which is specifically designed for women. The device and be purchased or the application can be installed in smart phones and can be accessed in emergencies. FEMME provides quickest and easiest way to contact for help, when a person is in distress. The application is activated by pressing the volume key and the power button together. When the application is being used, first it displays 4 main icons, audio recorder, SOS message, video recorder, hidden camera detector. Depending on the option pressed now, it either sends message and recording to the preset contacts or detects the hidden cameras. Whereas the device is activated by pressing the button on it, the device is linked with smart phone and it provides 2 buttons, one being

the emergency button and the other to activate hidden camera detection. If the emergency button is clicked once (Single Click) the GPS location is tracked and is sent to preset contacts once in every 2 minutes with updated location. If it is clicked twice (Double Click) audio recorder is activated and is sent to preset contacts with an emergency help message. If it is pressed for long (Long Press) it automatically calls the preset contact. By using ARM controller the device works without internet connectivity and is an all in one system, the controller uses less power and gives more efficiency.

The paper [2] proposes a device which is portable and it also resembles a belt. This device was developed after seeing few applications and devices such as VithUapp which was initiated by a popular TV series Gumrah aired on channel [V], SHE(Society Harnessing Equipment) which generates current to help victim escape, and ILA security founder designed an alarm that can shock and disorient attackers. This device includes Arduino board, GSM shield, GPS module, screaming alarm and pressure sensors. The arduino board consists of everything which requires to start up the microcontroller, it can be started by connecting it to a computer or powered with an adapter or even a battery. The GSM shield provides data, voice, SMS and fax in a small form factor with low power consumption. It is a very powerful single chip processor with high efficiency and speech quality and it supports low cost handsets and is also compatible with almost all telephone services. The GPS module provides current date and time, corresponding longitude and latitude, and also sends speed and travel direction if the victim is travelling. It helps to track the victim and makes it easier to access their location and find them. The screaming alarm offers single chip voice recording and playback capability for 40 to 60 seconds. It is ideally used in portable voice recorders. The pressure sensor generates a signal when pressure is imposed on it, it is usually used to capture the change in pressure. In this device a threshold limit for pressure sensor is set, and when the threshold crosses the device gets activated and tracks the location of the victim using GPS module and sends the location to preset contacts and other emergency services such as police control room for every 2 minutes with updated location. The screaming alarm will be activated and it sends sirens to let people know that there is trouble nearby and help is needed

The paper [3] proposed a system consists of wearable safety device having an emergency button for sending notification and camera for capturing assaulter image, thus location of the victim is traced with help of GPS and image gets captured. Emergency message with image link will be sent to all

mandatory contacts. Thus system can make better use of Arduino based on Linux board. Algorithms incorporated are of Haversine and Trilateration. The main goal of this project is to provide security to working women and school children. So they refined a wireless portable women safety device and school bus tracking system consisting of emergency press button for alert purpose and electronic camera for capturing image of that instance. GSM system traces the current location of the victim and sends alert messages and the embedded camera obtaining the image. Some of the related works are- i) Orlando Arias, Jacob Wurm, Yier Jin, "Privacy and Security in Internet of Things and Wearable Devices", IEEE Transactions on Multi-Scale Computing Systems, VOL. 1, NO. 2, April-June 2015. ii) Seok Ju Lee, Girma Tewolde, Jaerock Kwon "Design and Implementation of Vehicle Tracking System Using GPS/GSM/GPRS Technology and Smartphone Application", IEEE World Forum on Internet of Things (WF-IoT), March 2014, Seoul. iii) A. D. Thierer, "the internet of things and wearable technology: Addressing privacy and security concerns without derailing innovation" Rich. J. Law Technology, volume.21, pp. 615, 2015. iv) Muruganandham, "Real Time Web based Vehicle Tracking using GPS", World Academy of Science, Engineering and Technology, 37, 2010. v) R.Ramani, S.Valarmathy, N. Suthanthira Vanitha, S. Selvaraju, and M. Thiruppathi, Vehicle Tracking and Locking System Based on GSM and GPS, IJ. Intelligent Systems and Applications, 2013, 09, 86-93. vi) P. N. Mahalle, B. Anggorojati, N. R. Prasad, and R. Prasad, —"Identify authentication and capability based access control (IACAC) for the internet of things", J. Cyber Security Mobility, vol. 1, pp. 309–348, 2013. vii) J. H. Ziegeldorf, O. G. Morchon, and K.Wehrle,—"Privacy in the internet of things: Threats and challenges", Security Communication Network, volume. 7, no. 12, pp. 2728–2742, 2014. This paper also consists of a Mathematical model based on Set Theory Analysis. This paper presented a wireless method for the safety of women with an alert message and capture image via camera. Major deficiencies of such system are poor internet connection, defective instrument, Battery consumption.

The paper [4] proposes a device of smart intelligent security system for women which includes Raspberry pi 2, GSM SIM900A, GPS Receiver, Live Streaming Video, Extra features. These devices were introduced by certain existing systems such as: VithU app-An emergency app instigated by a popular Indian crime television series "Gumrah" aired on channel [V]. The stun gun-A small gun charges an attacker with electric shock, pumps about 700,000 volts into attacker's body. They run on lithium batteries. Fight back-A very basic app with only one special feature is the Facebook status update, apart from SMS and email options. The proposed design consists of portable instrument which traits a band on wrist, consisting of: Raspberry pi2- It is a series of credit card sized single-board computers developed in the UK by the Raspberry pi foundation. It is based on the Broadcom BCM2836 system on a chip, which includes an ARMCortexv7 900 MHz processor. Five to six million raspberry pi's have been sold till June 2015. GSM SIM900A-It is a specially designed type of modem which accepts a SIM card and operates over an approval to a mobile operator, just like a Mobile phone. These GSM modems are used for often used to

provide internet connectivity and also for sending-receiving SMS and mms messages. These were first introduced in Finland in 1991.The SIM900A is a complete Dual-band GSM/GPRS module in a SMT type designed basically for Chinese market, perks from small dimensions and cost effective solutions. GPS Receiver-This module continuously receives the data from the satellite and transmits correspondingly to the RS232, developed by US department of defence (dod). This module can support up to 51 channels and are used to simplify the embedded system integration process. Live Streaming Videos-By composing Wi-Fi, using Logitech c270 webcam and installing the motion software raspberry pi 2 models B. Thus we can see the live streaming video or else we can save. Extra Features-This feature basically consists of tear gas mechanism which can be incorporated on the one side of spectacles. For screaming alarm, a 3v electromagnetic buzzer is used to call out for help. Thus all these proposed systems are dealt with wristbands and spectacles. Likewise with GPS and live streaming of videos.

The paper [5] proposes model of a band which provides safety to women. The band has a transmitter which consists of Arm7 microcontroller to which power supply (battery), temperature sensor, motion sensor, heartbeat sensor, GSM, GPS and panic button are connected. This band starts working in two ways. First, when the threat arrives just by pressing the panic button the location of the victim is tracked with the help of GPS module and is sent to the preset contacts with an emergency help message to the receiving end which comprises of raspberry pi model or a laptop/pc that must have internet connection to receive data from transmitter, and through this help can be provided. Second, if the threat arises where-in her complete body is freezed that time the motion sensors come into picture where in the sensors will continuously send their values to microcontroller which will compare these values with the threshold values. If the sensor value exceeds the threshold value it automatically generates help message and sends it to the receiver end with the GPS location, through which the contacts can provide help to the victim. This band is small in size and is wearable.

The paper [6] proposes a security system for women. In this system there are two sections, one is transmitter which consists of emergency key, microcontroller, LCD, GPS, GSM, and buzzer and the other section is receiver which is the mobile phone. When the threat arrives, this system can be activated by pressing the emergency key, by pressing the trigger of this emergency key, it does two things. First, the microcontroller takes the value of latitude and longitude from the GPS module and transmits it to the registered mobile phone and to the control room via SMS through the GSM module. Second, at the same time it provides electric shock to the threat. The buzzer used in this system gets triggered and is used for alerting the surrounding near the victim and let the surrounding area know that there is something wrong and help is needed. The LCD which is used is just to show the information or the updates of the messages as in delivery notifications. Since there is usage of microcontroller in this system it consumes less power and the efficiency will be more. The device is portable and is easy to carry, the device can be

hidden in a purse and makes a person feel safe. This device sends message to the registered contacts and also has buzzer to alter the surrounding area.

The paper [7] proposes an application called women empowerment. This application can be installed in the smart phones. This application has mainly three modules they are, Violence against Women (VAW), Women's Health (WH), Emergency Call System (ECS). To use the above options user needs to sign in her/him only once. Different laws are included by VAW related to women. Crime related laws can be easily seen by user and take an appropriate decision to avoid crime which helps women to be conscious. It includes some cell number of lawyers and NGOs, where in the victim can access those numbers to get justice. WH includes women's health issues related to breast cancer, breastfeeding, fitness and nutrition, issues related to HIV/AIDS, mental health, pregnancy, vaccines etc. As women of our country are mostly working and are not health conscious, this application helps them to record their physical changes and help them instead of going to the doctor frequently. This application not only takes care about the health but it also helps women in difficult environment or when a threat arises. Emergency Call System (ECS) which will be activated by the user. Initially a user has to set an emergency contact number and can also save templates. When users are in danger they just need to press a particular button then this system will make three successive calls and sends a text message which was previously saved to the preset number. It also sends the location of the user using the Global Positioning System (GPS) in text message. Advantage of this app are unlike many other applications it not only just sends the location of victim to his/her family members but also helps in giving knowledge about the laws and the health related issues to women.

The paper [8] focuses on a security system that is designed merely to serve the purpose of providing security to women so that they never feel helpless. This paper talks about all the devices that are already developed for women safety such as, SHE (Society Harnessing Equipment): This device can generate 3800KV and provide electric shock to the victims, ILA security: It includes three alarms which can provide shock, disorient potential attacker, AESHS (Advanced Electronics System for Human Safety): it includes GPS module, Smart Band: It consists of a smart band module that contains Bluetooth low energy (BLE), motion sensors, Pulse rate sensors, temperature sensor. Smart band does 3 things, firstly Messages to family along with co-ordinates are sent, secondly the location is sent to nearest police station and at last it sends information to people near the surrounding requesting public attention. Advantages of this smart band are it uses many different sensors and hence it can be truly effective and trustworthy. It is integrated with smart phone hence low cost and it uses BLE (Bluetooth Low Energy) therefore power consumption is less.

The paper [9] proposes a concept of portable equipment which can be carried by the women which consists of a GPS, GSM model, LCD display and a physical button. This equipment is designed using the ARM 7 micro controller LPC2148. The advantages of this equipment is it consumes low power as it

uses arm controller which are more efficient in the present days, it also includes notifying the related authority for taking necessary actions on the culprits. This system can be made much better by installing a camera so that the culprits can be easily captured.

The paper [10] conducts a survey of 10 papers which are on women safety and security. It categorizes the technologies used in the papers into three categories and list out the disadvantages of all and proposed a model which included the features of all the technologies and added few more to them to overcome disadvantages and provide a better security system for the women. The proposed model included. i) Auto receiving call module - it helps to receive the call from registered contacts on the victim's safety device. ii) Spy camera detection module - which helps to detect the spy cameras in the changing rooms of shops and other places. iii) Fake call Tool Module- which helps in creating a fake incoming call which in turn helps women to escape from a bad situation, it acts like a precautionary measure. iv) Generate Electric Shock module - it helps in creating a high voltage electric shock which acts as a self defence device when women is in a threat.

## 2. GAPS FOUND IN THE LITERATURE

In paper [1] the device/application FEMME can be made better and the usage can be increased by making the product small so that it can be used as a watch or even a pendant and also there can be a voice keyword recognition which can trigger the device to send an emergency message to the preset contacts.

In paper [2] the device can be made more helpful by adding any defense element in the device in order to protect oneself if the help gets delayed, as a backup option.

In paper [3] the device has many advantages but at the same time it has many disadvantages too. The battery consumption will be extremely high so if there is any battery backup option it will be more efficient.

In paper [4] the proposed device is portable which has SMS options, screaming sensors and also defense element, thereby covering almost all needs. It can be more helpful by adding few more sensors like pressure sensors and detecting hidden cameras.

In paper [5] the device can be made more useful by adding any alarm to alert the victim's surrounding areas as rapid protection can be given to the victim as Internet cannot be relied on all the time.

In paper [6] the device can be made more effective by adding recording system in order to record the incident taking place which in turn can help get justice to the victim or even add sensors to activate the device automatically when in danger.

In paper [7] in addition to all the features present there can also be a defense element which helps women to deal with the threat not completely rely for other to come and rescue her.

In paper [8] the smart band should also be able to produce an alarm or buzzer sound so that it can be used to get public attention and the people can contribute in providing justice.

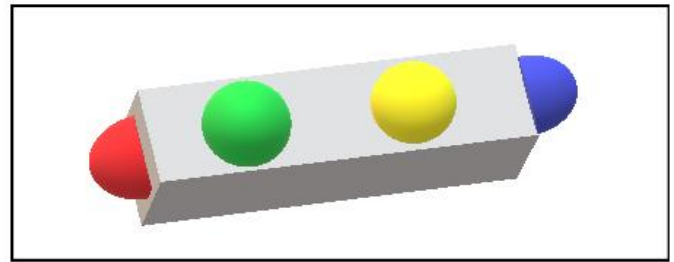
In paper [9] instead of sending the instant location of the victim a real time location can be shared to respective people as victim will be in panic and there is more chance of running which will lead to missing of the victim.

In paper [10] these were the new ideas which were not generally seen, but the major disadvantage of the proposed model is cost and implementing all the ideas into one system will cut down the pocket and increase the size of the system which makes it as non-portal device.

### 3. CONCLUSION

All the applications and devices are built by using new technologies and processors, where in it might become difficult to operate for women in rural areas and uneducated people, also makes it difficult for them to use smart phones and their updated features. And if the phone is running out of battery, the application present in the phone cannot be used. Therefore we propose here, a novel idea to make the device easily operated by rural women folk. The device can be designed to have 2 or 3 colored buttons on it, when the threat arrives a specific button can be pressed, where in the buttons will be programmed with required and necessary functions. As we see the proposed device has 4 colored buttons on it i.e., red, blue, green and yellow. When the red button is pressed it triggers the alarm sensor, the blue button sends an emergency message to the preset contacts, the green button records the audio and finally the yellow button helps detect hidden cameras. The smart phone problem cannot be easily solved because of its too many advantages, no other device can provide those many applications which almost support all the features required in order to use an application or even link a device and operate it. The battery backups of present smart phones are pretty good, but still a person always needs to make sure that the battery will last until the end of the day. There are many more portable devices just in order to charge the phones (portable chargers), they can be used to charge the phones before the battery dies. People who are not comfortable in using applications which are installed in smart phones can always opt for devices. The devices can be made in different forms and sizes using specific components. It can be a belt, band or even a cosmetic shaped item. Even defense items can be introduced in different forms such as lipstick stun gun which gives shock etc. By using these different forms of devices attacker can be tackled easily because he might not be aware and has no knowledge about the presence of such devices.

The proposed device:



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