



# **Emancipator Belt: Wearable Sonic Device to Prevent Sexual Harassment against Women**

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**ABSTRACT:** Violence against women is not a private family issue. It is a community and public health issue affecting not only the abuser and his victim but everyone around them. Women safety is one of the most alarming issues. Crimes against women have more than doubled over the past ten years. Recent global prevalence figures indicate that about 1 in 3 (35%) of women worldwide have experienced either physical and/or sexual violence [1]. It was shocking to know that over 50% of the rape victims were claimed to be minors [2].

Studies show that resisting sexual assault lessens the chance of rape taking place without increasing the violence of the attack. This paper represents the innovative application of wearable technology to prevent the crime against women. Emancipator Belt is made with a vision to make the society more reliable and secure for everyone. Emancipator Belt is a combination of both wearable (Belt) and mobile phone application that are connected to each other via Bluetooth[3]. The device has a user centric and robust design for the women. It is of great use for the women who feel that they are dependent on others.

**KEYWORDS:** Robust, Resisting, Innovative

## **I. INTRODUCTION**

Sexual violence is a serious public health problem affecting the health and wellbeing of millions of individuals each year throughout the world. Sexual violence is widespread, can be happen to anyone at any age, and threatens women and girls from a very young age, Sexual violence is wrong and harmful. According to the research there are many short- and long-term effects of sexual assault and rape that affect the mind, body and spirit[4]. Many survivors experience one or more of these effects and they are not mutually exclusive. For example, a physical reaction to trauma such as self-injury can be the result of depression. It has been found that 94% of women who are raped experience post-traumatic stress disorder (PTSD) symptoms during the two weeks following the rape [5]. 33% of women who are raped attempt suicide [6].

Emancipator Belt is meant to stop the sexual violence against women as it can even cause death to them. Emancipator Belt is wearable sonic device used for incapacitating an attacker without causing serious or permanent injury. It can be used as a deterrent to temporarily disable the attacker and provide you with a window of opportunity to escape to safety. The Belt comes with a complimentary mobile application which using cloud computing automatically sends messages to the relatives, emergency health centres and to the police authority asking them to come to the rescue of the victim.

## **II. FIRST PROTOTYPE**

### **EMANCIPATOR BELT (THE WEARABLE)**

The Emancipator Belt wearable is uniquely designed to make women and girls more secure and self-dependent. There is a microcontroller present in the belt once the belt is activated through the voice command the controller get activated the transducers embedded with microcontroller in the Belt are used to generate the ultrasonic waves with an

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approximate frequency of 20 kHz for 30 seconds .This creates the imaginary barrier between the user and attacker and it incapacitate the attacker without causing any kind of permanent injury and provide the user with a window of opportunity to escape to safety in case of any sexual assault [7].

## EMANCIPATOR BELT (Mobile Phone APPLICATION) AND WEBSERVER

The Emancipator Belt mobile application is an android based application which is being used to trigger the Emancipator Belt through the voice recognition Technology. Previous researches have proven that how mobile technology can help to create a world free from violence against women and girls [8]. The User says the code word like “HELP” and this voice is recognized by the Emancipator Belt application and this then trigger the Emancipator Belt. The Belt uses the Bluetooth of the mobile phone to connect to the Emancipator Belt and to get the data from the Arduino module of the device in the case of voice triggering of the device. Apart from this the GPS navigation services are used to track the victim’s location and notify them about the safe zones. The database for the safe zones in the country is continuously being updated to meet with the demands of the user. .The mobile application also sends emergency messages to the concerned authorities and the relatives of the victim at that very moment when the device gets triggered. The mobile app also has the X zone feature which alerts the women about the routes that are rated unsafe by the other users and government and also gives them the notifications of latest laws and topics related to women empowerment. It also tracks the location of the user every 10 seconds and updates the location on the server.

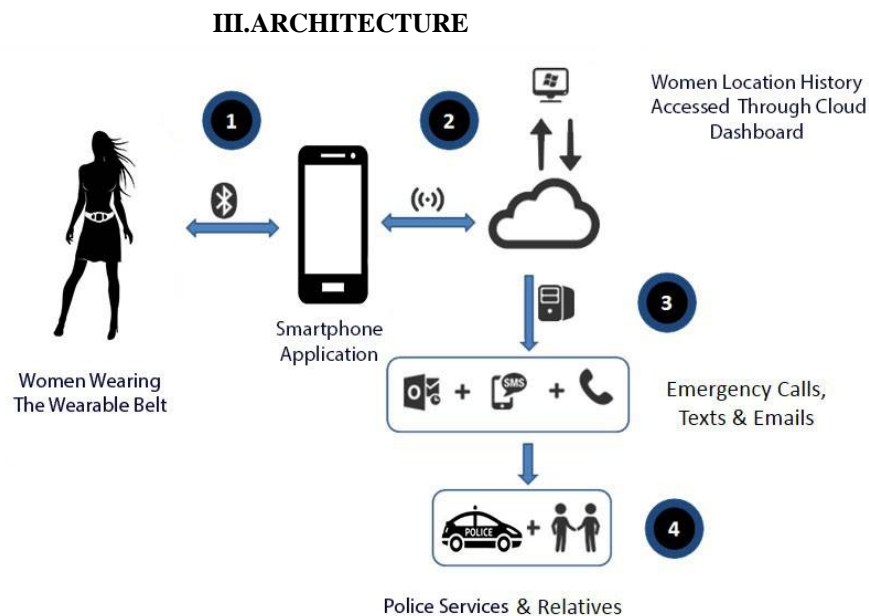


Fig1: Shows the architecture of the Emancipator Belt

In the above figure a women wearing the Emancipator Belt is shown whenever she will be attacked by the attacker she can activate the belt by giving the voice command like “HELP” This will activate the Belt to emit ultrasonic waves from the belt so that she can escape from the situation simultaneously the mobile phone application will send an alert message to nearby Police Station and her relatives so that they can rescue her.

## IV.USAGE SCENARIO

For the user who is first time using Emancipator Belt, the user have to wear this Belt under then she have to connect the device to mobile phone application through Bluetooth as soon as the device is connected the .GPS coordinates starts uploading on to the cloud server in every 10 seconds. In case if there is any sexual assault than the user can trigger the



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Belt by just giving a voice command “HELP”, this voice is then recognized by the mobile and then the transducers fitted in the Belt will start transmitting the ultrasonic waves at an angle of 45 degrees forming a conical flask so that it may not harm the victim and can incapacitate the attacker so that the user can escape from the situation and can save herself from any sexual assault. With this the SMS stating that the user is in some danger situation with her geo-location is sent from the user mobile phone to her relatives and nearby emergency services so that she can be rescued from any type of sexual assault.

## V. CONCLUSION

Emancipator Belt will help the women to feel safe and will empower them to move freely and feel confident. They will not be dependent on anyone they will have ability to protect themselves. The emancipator not only helps the user to protect herself but it also helps in reporting the case as only 344 cases are reported out of 1000[9]. Emancipator Belt will help in solving one of the greatest challenge faced by humanity.

## VI. RESULTS

We have prepared a working prototype and have tested the device with the target audience as a part of our pilot program in the Delhi-NCR region and have received an excellent feedback from the users. The device has been well accepted by the users and the users feel more secure while wearing the device. The development of this device has resulted in safety of women in the region and has provided them independence.

## VII. FUTURE DIRECTION

The Emancipator team is currently working towards reducing the cost of hardware and reducing the size of hardware. The team is also exploring scenarios and emancipator Belt-like devices that involve other types of methods to save women from sexual assaults. They are also interested in studying how the emancipator Belt will work as a wearable computer in saving women in different situations of sexual assaults. With emancipator Belt the team looks forward to make this world a safer place for women.

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