Anti-Assault Device

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I. Abstract: The number of street crime attacks on women, children and Law enforcement officer has spiked in recent year. This paper presents a wearable safety device which can prevent a sudden assault. Such wearable technology can be used by law enforcement squads, women and civilians commuting via routes which are more prone to assaults. This device has been innovated especially keeping in mind the safety of women during a sexual harassment situation. The *ANTI-ASSAULT CLOTHING* (*AAC*) comes in two forms a jacket and wearable straps which can be custom fitted onto an individual's clothing. It can be broken down into three main parts, namely the insulating layer, conductive layer and the triggering mechanism. The insulating layer, as the name suggests protects the user's body from being shocked. The conductive layer is the upper exposed portion of the clothing which delivers harmful shocks to the attacker(s) and the triggering mechanism lets the user control when the shock is delivered. Other than these parts, the circuit used is similar to that used in stun guns and can provide an output ranging from 15kV to 20kV which can lethally harm the attacker. The power source would consist of a 12V portable rechargeable battery with a high density and small volume

II. Index:

GPS –global position system, BLE-Bluetooth Low energy, TLD(three layer device)

III. . Introduction:

Street assault nowadays is a menace in the world. Everyday women are sexually harassed, civilians are robbed and law enforcement officers are harassed by miscreants. A survey by the Wall Street Journal in 2015 says that more than one in four women is sexually assaulted by the time they graduate. [1] With respect to rape, NCRB data gives the number of cases registered in all states, 1,636 in Delhi in 2013. One of the most terrifying examples is the December 16th, 2012 gang rape case on a local bus in Delhi, India. Recently, on 16th August 2015, [2] a police officer in Birmingham, England was beaten unconscious by a suspect, after the suspect was pulled over for driving erratically. This rising menace needs to be curbed and anti-assault clothing would serve as one such product that can offer better protection against such assaults, while the work of changing society's violent culture moves forward. [3] There are a large number of such anti rape/assault products already existing in the market, most are made especially for women like the *anti-rape condom*, *femdefense tampon*, *hairy stockings*, *the snare* [4] and so on but these are just simple contraptions designed only for women, which may or may not be effective at the time of assault. *Anti-assault Clothing* will take protection against assault to a whole new level by replacing all these user specific products by a simple unisexual

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jacket which protects the user from violence and sexual harassment as well.

IV. *The Anti-Assault Device* OVERVIEW:

A.**Insulating layer:** The insulation layer is responsible for separating the user and the conducting layer, which saves the user from high voltage shock.[5] The insulating layer is chosen keeping in mind certain factors. Firstly the layer should not burn or get heated due to the high voltage. Moreover the layer should be such that it offers the user complete comfort like any other piece of clothing. Keeping the latter in mind, the prevalent weather conditions play an important role in the selection of the fabric. For example in cold condition the synthetic fiber [6] like polyester and nylon can be used as such material are good for breaking the wind and are also used in the inner linings of wind cheaters. In warmer climatic condition glass fiber, cottoncan be chosen as they are porous and let air pass through them easily.

Nylon threads

Picture courtesy:http://www.open.edu/openlearn/science-maths-technology/science/chemistry/how-nylon

Glass Fiber & Cotton Spools

Picture courtesy:
http://www.diytrade.com/china/pd/367412/Various_Kinds_Of_Glass_Fibre_X_1.html
http://www.suessewing.co.uk/about-us

B.**Conducting layer:**As the name suggests the conducting layer is the part of the clothing which shocks the attacker. The proposed conducting layer can be attached in 2 different schemes:

A) The conductive clothing is attached on the entire surface area of clothing so as to have maximum effectiveness when it comes to protection.

B) The conductive layer can be attached onto clothing as straps over the shoulders, arms, chest and legs so as to provide cost effectiveness, aesthetic appearance and safety against molestation and rapes.

In case of Scheme A, the conductive fabric would be woven onto the insulating layer itself so as to form a two layered garment, whereas in Scheme B, the conductive fabric would be attached onto the insulating fabric as straps, designs, which can either be stitched onto the garment itself or be custom made with velcro so as to be stuck onto different sets of clothing

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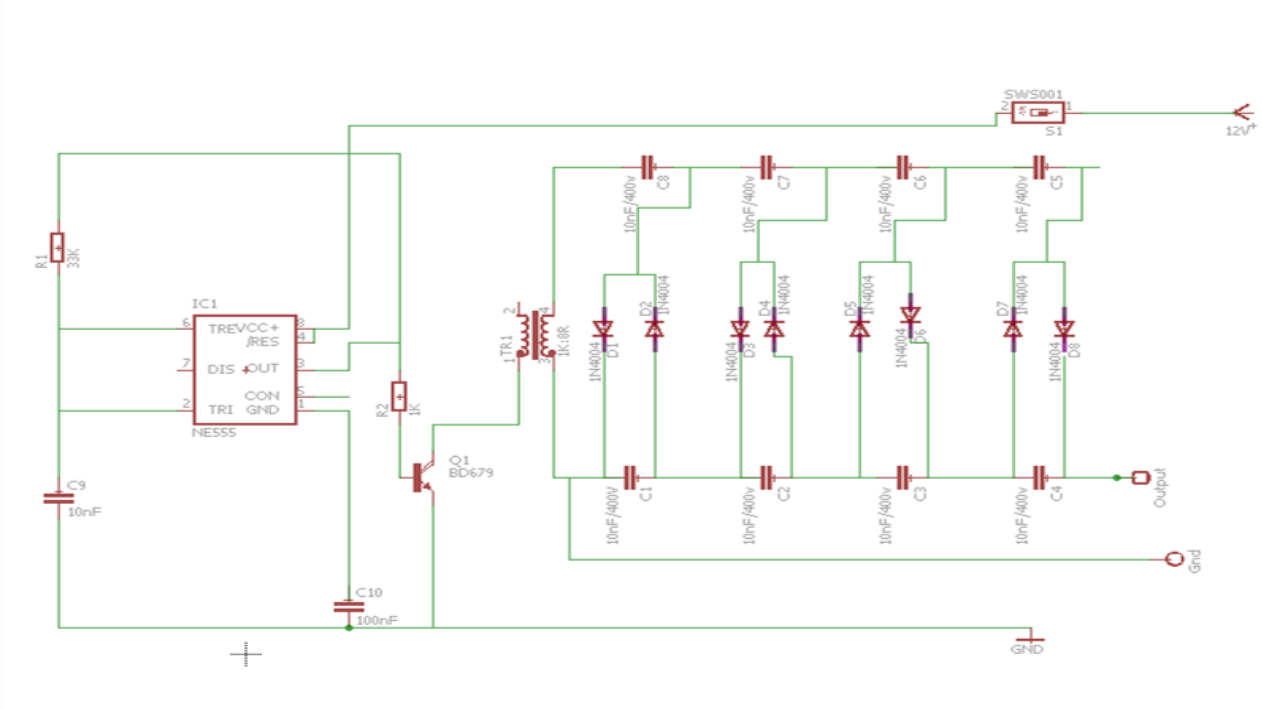
C.**Triggering mechanism:**

The triggering mechanism plays a vital role in the device. The trigger mechanism should be such that it is easily accessible by the user and is a fail-proof trigger. Keeping this in mind we have tested two methods to turn on the device, via voice command, via a switch which would be concealed in the clothing. To reduce the circuit size manual switching is most efficient but in some cases of assault wherein it is not possible for the user to trigger a switch with their hands voice commands can be a very effective and helpful method of activating the device. The voice command triggering can be done by the help of a microcontroller connected wirelessly with Bluetooth or WiFi to the mobile phone and the use of Google Voice Actions API. There are many other creative ways to implement triggering but the above two are by far the most practical and fail proof mechanisms.

D. **Electronic Circuit:** – The electronic circuit is shown in the diagram , it is a simple voltage amplifier, which has a very high voltage output and a low current output. It has been simulated using ORCAD, PSPICE, and CircuitWizard.



Circuit Schematic

E. **Battery:**The battery used to power the device should be safe to use, light enough to carry around, small enough to fit inside one's pocket and should last long. The perfect battery type for this application would be NiMh(Nickel Metal Hydride) batteries. A standard 10S, 2000mAh battery pack would weigh no more than 250g and fit snugly into average pockets. Moreover a battery with 2000mAh would last approximately 400 hours or more depending on the current drawn by the circuit.

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10S 2000mAh NiMH Battery pack

Picture courtesy: amazon.com

V. Health Risks:

The device when used in normal operating conditions is completely safe and does not pose any health risks to humans or their surroundings. Some people feel uncomfortable to wear a device on their body which will give shock, being afraid of short circuit and battery explosion.

These are two health issue which we are trying to eliminate in the device

VI. Future Developments:

As of now we are only considering two options for the triggering mechanism, but in the near future e would also be developing a third layer on the outer side which would activate the circuit if it is breached. Also we would develop a more advanced algorithm for activating the circuit by mapping the user's brainwaves. Brainwaves have a certain range of intensity and waveform when a person is subjected to physical or sexual torture, this would help in triggering the device. We will also keep upgrading the materials of the insulating layer and the conductive fabric as per feedback from the users.

VII. Conclusions:

The device still in developing stage, but it has a huge scope of creating the impact in the society. It is one of those devices which will bring harmony in society, and is a reliable option. With further advancement like Bluetooth enabling, GPS, this device will become the one and only way for protection from the assault

VIII. References:

[1] http://www.wsj.com/articles/more-than-1-in-4-college-women-report-sexual-assault-by-graduation-1442881054

[2] http://www.nationalreview.com/article/422605/sBirmingham-cop-beaten-unconscious-feared-racism-charge

[3] http://thinkprogress.org/health/2014/06/10/3447269/guide-prevent-rape/

[4] http://www.theguardian.com/lifeandstyle/womens-blog/2013/nov/11/problem-anti-rape-underwear-chastity-belt

[5] https://www.google.co.in/search?q=glass+fiber&safe=active&es_sm=93&source=lnms&tbm=isch&sa=X&ved=0CAcQ_AUoAWoVChMIquja-ommyAIVQtYsCh2dEAoU&biw=1242&bih=585#imgrc=_

[6] http://www.no-contact.com/index-4.html

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