

A Self Defense Wearable - Anti - Molestation Jacket



Fashion Design

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ABSTRACT

Violence against women is a serious problem plaguing the world. This research and consequent product development (Anti molestation jacket) was an endeavor to develop an effective self-defense gadget which would provide protection to women in case of any assault or unsolicited contact. This jacket uses electric shock as a deterring agent, which immobilizes the assailer for a few moments and thus giving the victim time to escape and/or make a rescue call. The shock pulse or the jolt would surprise the assaulter and deter him from approaching further. This jacket is designed in a way that both the aesthetics and the desired functionality are harmonized. Anti molestation jacket is effective, comfortable, unobtrusive, deceptive and an economical self defense gadget for women.

INTRODUCTION

Violence against women is a serious problem plaguing the world; the sexual crimes against women remain still a cause of deep concern not only in developing but in the developed world also. According to the World Bank's 2012 World Development Report¹ on Gender Equality and Development, around one in every three women in the world experience physical or sexual abuse at some point in their life. According to the rape statistics released by the National Crime Records Bureau (NCRB)², in the year 2012 approximately 80,000 cases of rape and molestation of women were registered in India. Many devices and gadgets have been created in attempt to provide women with self defense mechanism. One of the effective method has been with the use of electricity.

Human body conducts electricity if it is in contact with an electrically charged surface while simultaneously being in contact with another surface at a different potential. The magnitude of the current is directly proportional to the voltage difference across the surfaces (Bikson2007)³. According to Leibovici et al. 1995; Karger et al. 2002 electric shock can induce violent muscle contraction^{4&6}. Electric current of sufficient magnitude when conducted through a human body overrides tiny electrical signals used by nerve cells for communication to and from the brain, overloading the nervous system and preventing signals from being able to actuate muscles. The muscles because of this disruption and the ensuing electrical shock results in contracting and expanding rapidly. This rapid work cycle depletes blood sugar by converting it to lactic acid in just seconds. The resulting energy loss makes causes disorientation and loss of balance and incapacitates the attacker for several minutes without causing significant effect on the heart and other organs. Current of 10-30 mA causes muscular contraction without causing permanent damage to the human body (OSHA)^{4&5}

This research and consequent product development was an endeavor to develop an effective self-defense gadget by use of electricity.

METHODOLOGY

Methodology followed for development of self defense wearable - Anti-molestation Jacket

- Studying the current available technology of deterring devices for their techniques and limitations and identifying the most effective method.
- Studying and selection of available raw material for the

jacket i.e. non conductor light and breathable Shell Fabric, non conductor and water repellent Lining material, conductive Contact points, pliable wires, Transformer switch and battery unit to create circuitry.

- Selection of garmenting techniques which are effective and commercially viable
- Development of prototype
- Evaluating the functionality and performance of the developed prototypes.

OTHER SELF DEFENSE GADGETS

Pepper spray

Pepper spray^{8&9} is available in an aerosol form having oleoresin capsicum. Contact with eyes, nose, throat and lungs causes instant capillary dilation resulting in tearing of the eyes, temporary blindness and breathing restriction. - the assaulter will be incapacitated long enough for the victim to get away or get help. However, since the spray is in the handbags the operating time is long.

Wrist Band

Wrist band¹⁰, according to a BBC report, was developed by a school boy in Delhi. The band monitors pulse rate and nerve impulses of the wearer and in situation of threat when pulse rate and nerve impulses increases it gets activated and delivers a mild jolt of 0.01 ampere to the attacker on contact. The efficacy of device is limited by its small contact area.

Other commercially available wrist bands only sends SOS message to nearest police vans and expects person to wait for the help.

Camouflage Dress

The camouflage dress¹¹ is designed by Japanese designer Aya Tsukioka consists of printed panels to be camouflaged as a cold drink dispensing machine panels which the wearer has to unzip and pull over. The operating time associated is high (2-3 minutes) and resulting look is not similar to original machine.

No Contact Jacket

MIT and Harvard developed a **no contact jacket**¹² having an electrically conductive pathway applied over the body of the jacket and an electrically charged construction for producing an electric charge on the outer surface of jacket. The electric discharge is through conductive fabric. This is the most effective solution; however due to very high cost of conductive material this solution becomes commercially unviable.

Other devices which have been experimented with and patented¹³ like a security ring US 4242715, an electric glove US 4370696, a weapon to deliver electrified projectiles EP 1718134, a charged forearm band WO 2010/036402 etc. has one or more limitations like it covers a small surface area on the body or has uncomfortable material or too expensive

The use of electricity as deterring agent was common feature in many of the effective devices. This was used in anti molestation jacket.

OPERATING PRINCIPLE OF ANTI MOLESTATION JACKET

Jacket is inspired by "stun gun", which works on the principle of momentarily shocking the person with a low-voltage pulse delivered between two electrodes. The shock has the effect of temporarily immobilizing the person giving the wearer time to escape.

PROTOTYPE DEVELOPMENT

This device-cum-garment has two components – Functional Component and Aesthetic Component.

Functional Component

Functional component comprise of the operating technology of the jacket which includes circuit and network of wires for delivering shock. The circuit is an inverter circuit having transformer powered by a 9 Volt D.C cell producing an AC output of 110V and 15– 30mA current. Circuit is connected with mesh of wires concealed between the outer layer and inner lining of the jacket. These meshes of wires are connected with metallic rivets on the surface of the Jacket and to the circuit on the inside of it. The wire circuits are in parallel so that in case of accidental breaking of circuit the jacket is not rendered non functional. The charge is delivered to the surface of the garment through the metallic rivets which are contact points for transfer of charge to the assailer. A hidden switch activates the circuit, when pressed, delivering the charge to the contact points on surface of the jacket. The contact- points have been placed at a distance from each other to ensure maximum probability of contact and are camouflaged in the styling of the jacket. The jolt will be delivered if at least two contact points are touched by the assailant while the circuit is activated. The metallic contact points have been placed judiciously in such a way that it gives maximum coverage to the wearer without resulting in short circuiting by accidental touching of the contact-points.

Aesthetic component

It comprises of the styling of the Jacket. Jacket is a layered garment having two layers of textile material. Jacket works on the principle of giving electric shock to the assailer though the metallic contact points on the outer surface of the product. The jacket has been styled in such a way that it camouflages the contact points in embellishments of the jacket and makes it appears like a normal trendy jacket thus the jacket bears no special appearance but has special features. The jacket is also lined with water repellent polymer coated taffeta to protect the wearer against the electrically charged jacket. This lining not only guards the wearer against any accidental leakage but also prevents water (from the body perspiration) to come in contact with the network wires.

RESULTS

Many options of fully functional Anti molestation Jacket were created as proof of design and concept

Prototype 1: A sleeveless camouflage jacket as shown in Figure 1 with metallic rivets (contact points) as surface embellishment with networking wires between lining and shell fabric. The circuit is not detachable.



Figure 1: Jacket made from regular garmenting technique

Prototype 2: The denim jacket as shown in Figure 2 has special feature of orifices (buttonholes) at regular intervals. The metallic contact points are pushed to the garment surface through these orifices with their one end attached to the networking wire. This feature makes the circuitry completely detachable hence garment can be washed or dry-cleaned when needed.



Figure 2: Denim Jacket having orifices

Prototype 3: This jacket as shown in Figure 3 draws an inspiration from the traditional knotting method. A wooden frame is constructed in accordance with the pattern of the jacket which is then bordered with nails all along the frame. The yarns are then made to run in horizontal and vertical manner on these nails and the cross over points are knotted with a separate set of yarns and cut to make into a pile. The wires are embedded in this horizontal and vertical network of yarns and are connected to the metallic rivets (contact points) on the surface of the jacket.



Figure 3: Jacket made from traditional knotting technique

CONCLUSION

The developed prototypes of Anti-molestation Jacket were fully functional and gave a mild electric shock of 15-30mA which induced a momentary loss of control thereby giving the victim time to call for help or rescue herself. The developed jacket weighed 800- 850 grams which is comparable to denim jackets or lined casual jackets and cost of manufacturing is estimated to be less than INR 1500/- (around US\$ 30) which makes it a commercially viable product. Patent on anti-molestation jacket is awaited

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