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A Review Paper on Women Protective Garment Using Copper Yarns

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ABSTRACT

The proposed research work is to develop new innovative women protective garment using copper yarns which helps the women to protect themselves. Copper polymer gives better comfort than fabrics. The developed fabric was converted into overcoat garment for women. Overcoats are referred as topcoats, to be worn as a outer most garment usually. It is worn by both women and men's. The circuit was developed and attached inside the garment to produce static discharges to protect themselves. Whenever the wearer receives unwanted advances, the switch can be pressed by the wearer who is placed inside the garment. When the wearer presses the switch, the electric charge was produced on the surface of the garment which emits the electric shock to the external sexual harassing persons. Hence the newly developed electromagnetic copper protective garment is the best safety measure for the women's problem and it will be an effective solution to the women to protect themselves from sexual abuse problems. Every woman can protect themselves by using this developed garment along with their common wardrobes.

Keyword: - Protective garment, electrostatic discharge, polyesters, textiles, copper yarns.

1. INTRODUCTION

The 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), 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. The research project is mainly concerned with societal problem of women abuse and safety. Clothing plays an important role in protecting the women, Antirape clothing helps to protect themselves from unwanted sexual advances. The developing e-textile garment will provide better self protection to the individual whomever wearing the garment. For the development of e- textile garment we have selected cotton, polyster, copper yarns. The cotton which gives more comfort and the polyster which provide static conductivity in nature it helps to improve electro\static conductivity in the garment. The major role of copper yarn is to provide electrical conductivity through the circuit connected with battery to produce charge.

2. LITERATURE REVIEW

At the end of the 19th century, as people developed and grew accustomed to electric appliances, designers and engineers began to combine electricity with clothing and jewelrydeveloping a series of illuminated and motorized necklaces, hats, brooches and costumes. For example, in the late 1800s, a person could hire young women adorned in light-studded evening gowns from the Electric Girl Lighting Company to provide cocktail party entertainment.

R. Suresh kumar [1],the Museum of Contemporary Craft in New York City held a ground-breaking exhibition called Body Covering that focused on the relationship between technology and apparel. The show featured astronauts' space suits along with clothing that could inflate and deflate light up, and heat and cool it. Particularly noteworthy in this collection was the work of Diana Dew, a designer who created a line of electronic fashion, including electroluminescent party dresses and belts that could sound alarm sirens.

S. Gorgutsa, J.F. Gu and M. Skorobogatiy [5], created the first fully animated sweatshirt. The shirt consisted of fiber optics, leads, and a microprocessor to control individual frames of animation. The result was a full color cartoon displayed on the surface of the shirt. in 1995, Wainwright went on to invent the first machine enabling

fiber optics to be machined into fabrics, the process needed for manufacturing enough for mass markets and, in 1997, hired a German machine designer, Herbert Selbach, from Selbach Machinery to produce the world's first CNC machine able to automatically implant fiber optics into any flexible material. The first ECG bio-physical display jackets employing LED/optic displays were created by Wainwright and David Bychkov.

J.F. Gu, S. Gorgutsa, and M. Skorobogatiy [6], using GSR sensors in a watch connected via Bluetooth to the embedded machine washable display in a denim jacket and were demonstrated. Additional smart fabric technologies were unveiled by Wainwright at two Flextech Flexible Display conferences held in Phoenix, AZ, showing infrared digital displays machine-embedded into fabrics for IFF (Identification of Friend or Foe) which were submitted to Fashion houses like CuteCircuit are utilizing e-textiles for their haute couture collections and special projects. Cute Circuit's Hug Shirt allows the user to send electronic hugs through sensors within the garment.

A. M Cardenas-Valencia, C. J. Biver, L. Lanebrake [8], the market for electronic textiles and wearables will require the integration of electronics into fabrics, whilst maintaining the ability of the textiles to drape and conform to the body. Initial developments in electronic textiles included electronic devices within pockets, or attached to garments. Electronic textiles were developed with electronic functionality added by incorporating conductive yarns into a textile. Further developments led to integration of electronics into textiles through incorporation of small electronic components such as multi-terminal package dies within the yarn structure.

3. METHODOLOGY

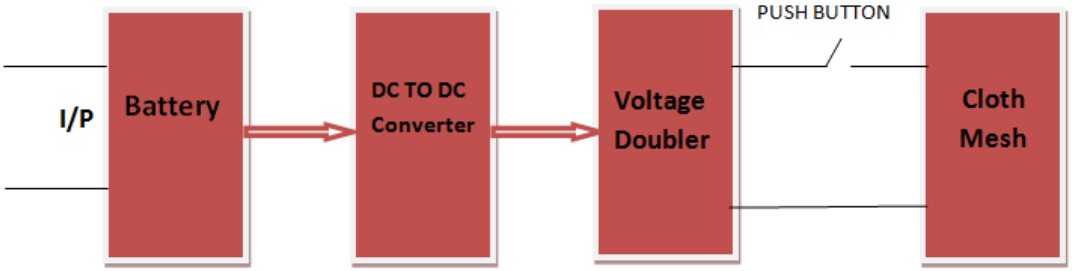

Fig. 3.1 Block Diagram of protective garment

3.1 Battery Description

Traditional galvanic battery cells, which were discovered centuries ago, still show their robust vitality in the scientific and industrial world due to their ease of operation and 2 simplicity of electro-chemistry. Among a large number of galvanic cells, the Al-NaOCl system has been comprehensively studied due to its advantages such as cost-effectiveness, availability of the chemical components and high current-carrying capacity. In this paper we first show how a generally bulky galvanic cell can be made in a slender fiber form by using fiber drawing technique. The fiber battery is fabricated from rods of low density polyethylene (LDPE) that features good chemical resistance to aqueous solutions of salt, acids and alkalis, and a large number of organic solvents.

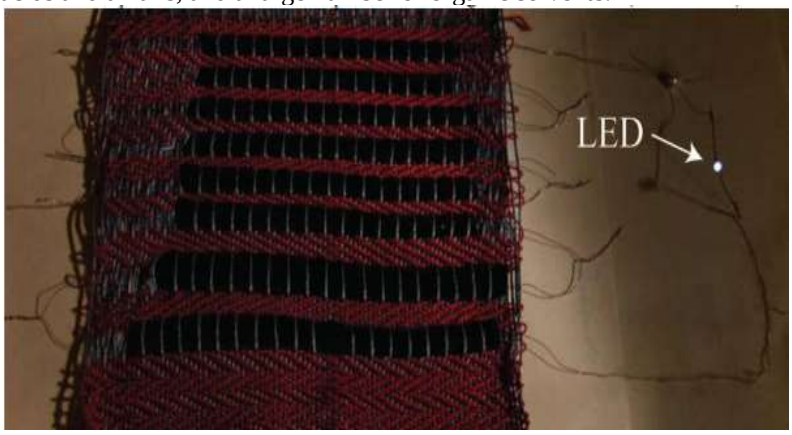

Fig -3.1.1 Cross section of a Li-on battery

To fabricate the fiber, we first drill three intercommunicating holes in the LDPE rod to form a fiber perform. Then, the preform is co-drawn in the drawing tower with aluminum (99% pure) and copper wires (99% pure). Up to several km of battery fiber can be produced in a single run using our research-grade drawing tower. The cross section of a typical ~1mm diameter fiber battery (without electrolyte). The central hole that separates two metallic electrodes is then filled with NaOCl (bleach) electrolyte. The capacity of such fiber-based batteries is measured to be ~10 mAh per 1 meter of fiber. We note that a key factor that limits performance of our fiber battery is generation of the hydrogen gas, which eventually displaces the electrolyte from the central hole, thus interrupting the normal functioning of the battery. The advantages of the proposed fiber battery are low cost and commercial availability of all the components, capability of mass production, the lack of poisonous materials, and simplicity in electro-chemistry. More importantly, due to its flexibility and light weight, the fiber battery can be weaved into a wearable battery textile or integrated into other "smart" textiles as power source, which allows the fiber battery to find its niche market in many scientific and industrial applications .

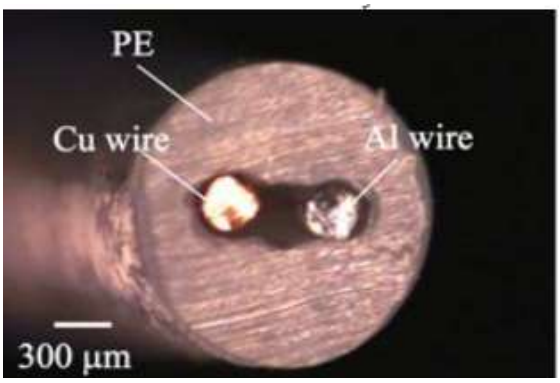

Fig -3.1.2 Cross section of a fabric battery

4. SELECTION OF YARN

Cotton has many inherent properties like softness, breathability, moisture absorbency, strength, drapability, heat resistance, high wet strength, non-allergic, non irritant and also it has high insulation property which is one of the most required characteristic in this project to protect the wearer from the shock. It is easy to handle & sew and gives better comfort to the wearer. Also it is an eco-friendly fibre. It has good air permeability in nature, suitable for all the seasons (like summer, winter). So that as a self perspective garment wearer can use it all time without anydiscomfort. Polyster has high strength, high durability, it improves the serviceability of the product. It has static conductivity property in its nature which helps to improve the electrostatic charge in the garment which gives more protection to the wearer. Also manufacturing and using of hollow polyster fibres acts as an insulation. It resists shrinkage, wrinkle and abrasion. The overcoat garment we make with circuit cannot be washed most frequently so the properties like shrinkage resistance, wrinkle resistance and abrasion resistance and mildew helps the wearer to feel better and gives neat appearance while going out. Copper yarn is an electromagnetic wire which has high conductivity property. It has high tenstile strength, creep property, it helps to weave the fabric in required pattern. We have selected thinner 40gauge copper yarn for weaving the fabric with cotton and copper. Copper plays a major role in producing electrostatic discharge with the help of a circuit insulated with the garment. Based on the yarn qualities the copper, cotton and polyster yarns were selected for the study to develop electromagnetic women protective garment.

5. CONCLUSION

The developed new innovative garment is 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 garment 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/-.

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