

# DESIGN AND DEVELOPMENT OF NOVAL METHODOLOGY FOR ELECTRIC SAFETY JACKET

<sup>1</sup>Dr. MD. QUTUBUDDIN, <sup>2</sup>SAMPANGI JAGADISH, <sup>3</sup>MARATI MOUNISH KUMAR,  
<sup>4</sup>NARRA SUPRAJA, <sup>5</sup>SK. SHOAIB

<sup>1</sup>Associate Professor, Dept.of EEE, TKR COLLEGE OF ENGINEERING AND TECHNOLOGY,  
Meerpet, Hyderabad, [mdqutubuddin@tkrcet.com](mailto:mdqutubuddin@tkrcet.com)

<sup>2,3,4</sup>BTech Student, Dept.of EEE, TKR COLLEGE OF ENGINEERING AND TECHNOLOGY,  
Meerpet, Hyderabad,  
[jaggusampangi030@gmail.com](mailto:jaggusampangi030@gmail.com), [maratimounish@gmail.com](mailto:maratimounish@gmail.com), [suprajanarra134@gmail.com](mailto:suprajanarra134@gmail.com),  
[sk.shoaib1029@gmail.com](mailto:sk.shoaib1029@gmail.com)

**Abstract:** *This work presents an innovative approach for concept design of new passive safety devices and their development. The landscape of possible design solutions was examined with an in-depth analysis of the state of the art and with the use of conceptual design tools. Candidate solutions underwent a feasibility assessment and they were crossed-checked with the rider needs, identified via a specific on-line survey. The concept of a new passive safety device was born: a Belted Safety Jacket (BSJ). An initial assessment of the device effectiveness for the reduction of riders' injuries was performed by comparison of the main biomechanical indexes (HIC, Nijmax, Chest Deflection and Viscous Criterion) in a relevant accident configuration, reproduced in a virtual environment, with and without the device. Later a full factorial Design of Experiment (DOE) was carried out to understand the influence of the device geometrical variables (i.e. possible design parameters) on the biomechanical indexes.*

**Keywords:** *Electric safety jacket, Design of Experiment, Child and Women Trafficking.*

## I. INTRODUCTION

Now a days, women trafficking and harassments has been become one of the global problems. Women are suffering a lot due to these situations. They are unable

to travel alone because of abusements. Women often become victims because they lack strength, are more vulnerable and insecure. So, they are socially responsible for suffering in silence then men. Not only

women are suffering but also problems like kidnaps, children trafficking and bullying are the issues peoples facing throughout the countries. Sexual harassment comes in many forms and not only just a single one. It includes when someone tries to touch, grab or make other physical contacts with you without your consent. These types of situations are happening at the places like schools, work places, at the time of journey etc. There are also situations the people take advantage in the name of friendship and misbehave. And some people fall for online dating sites to meet an unknown person in real, then they will end up in horrible situations [1]. No one in this world deserves to go through sexual harassment. We all have right to live freely without being abused are bullied. So, to overcome these kinds of situations we have to defend ourself. In the sense of self defence there many tricks we can use like karate, by using technology and some sprays. Has we known that government have also support the self-defences. So, we can use different gadgets to self-defence and avoid those situations. And also, we can reduce harassments, kidnaps, abusement etc. we have many technological methods in the society to

develop a gadget to use on these kind horrible situations [2].

In the last years, in Italy, in Europe and in the rest of the world, the Powered Two-Wheelers (PTWs) circulating park constantly increased. This phenomenon was strictly linked to the user unremitting demand for mobility. Specifically motorcycles, scooters and mopeds play a significant role in cities around the world, where traffic congestion and parking spaces represent a relevant daily problem. As such, PTWs are becoming a more and more important component of the transport system. However, PTWs inherent instability and the absence of passive safety protective devices or structures represent a challenge for road safety. Riders are at far more risk than car drivers per kilometre ridden in terms of fatalities and severe injuries compared with car occupants (Holgate et al. (2015)). Moreover, although the holistic approach to safety includes different factors (e.g., safe road, improved user training, safe vehicle, etc.), protective systems are still a cornerstone to ensure more tolerance in case of riders' or other road users' errors. This study aims to deepen previous knowledge in Powered Two-Wheeler passive safety with an innovative approach

in this field, capable to systematically explore all possible design solutions, in order to find new devices/systems able to increase rider safety. In the first section, the tools and methods employed in the research will be presented. Specifically, the conceptual design tools used to solve the main problem of riders' accident injury mitigation, will be introduced. Initially in-depth research of the state of the art in passive safety applied to PTWs was carried out. Subsequently, a specific survey, based on the principles of Kano's theory (Kano et al. (1984)), was created to evaluate candidate factors to improve customers' level of satisfaction on passive safety devices: the survey was targeted to understand stakeholders' habits, needs, features to be implemented or not in a new design. Lastly the creation of a network of plausible solutions, named Network of Problem (NoP) (Khomenko et al. 2007), allowed to investigate the landscape of possible conceptual solutions and to find new development paths and solutions. The candidate solutions were assessed with weighted criteria emerged from the survey and from the analysis of the state of the art, in order to choose the potentially best one [3].

This study developed a multifunctional smart outdoor jacket prototype with a series of functions designed to help its wearers manage hazardous or risky outdoor situations by sensing and identifying potentially dangerous environmental factors to prevent accidents and injuries. The study aims to create a multi-channeled wearable HAR system using clothes as a platform that can measure a user's heart rate and body heat while analyzing its user's state of activities and environmental factors. This step was followed by an investigation for the optimal garment platform design and technical design that enables the selected functions. The wearable operates in conjunction with a smartphone to delegate complex computing processes and use it as a display screen, reflecting the latest research and development (R & D) trend in wearable technology to avoid sacrificing comfort and ease of movement. The digital system components installed in the garment platform are kept as compact as possible without interfering with the system's functionality during the technical design process.

## II. LITERATURE SURVEY

Mann et al. [4] introduced the concept of wearable technology in the 1960s. However, its technical realization had to wait until the 2000s, when significant advances were made in mobile communications technology. The advent of affordable compact and light mobile devices gave a new impetus to wearable research with related R & D actively undertaken by the industry, academia, and government research institutions. The effort to develop wearable devices worn close to the body to assist users in their work and daily tasks by extending their cognitive and physical abilities led to the emergence of smart clothing integrated with various wearable technologies. Land Warrior (smart military uniforms developed by the US army) and Life Shirts (medical clothing developed by Vivometrix) are two well-known examples. Many wearable technology researchers have shown a keen interest in clothing as a wearable platform as garments are near-constantly worn and sit closer to the skin than any other items worn on the body. Clothing and wearable research aims to harness garments' potential benefits, such as near and constant presence and mobility. These topics focused on designing and enabling functions optimized for specific

purposes simultaneously while augmenting their fundamental roles. Currently, key paradigms in clothing and wearable research include wearable sensing (body sensing), context-aware computing, wearable interfaces, and augmenting traditional functions of clothing.

#### A) HARASSMENTS:

How to identify if someone want sexual favors from you? Here are some situations that can help to find such type of person. Leering and staring continuously also count as one. Another form is making sexual gestures towards you and cracking sexual jokes are comments towards you. It is also not acceptable for someone to question you about your sexual life are insult you with sexual comments. Further making and obscene phone call are indecently exposing oneself also counts as sexual harassments. Sexual harassment can impact a person severely. It may stress out the victim and they may suffer from anxiety are depression. We have to make sure about the policies and procedures regarding sexual harassment in your workplace, school or university



Fig.1 Harassments

Harassment is a broad term that refers to any unwanted or unwelcome behavior that is offensive, intimidating, humiliating, or threatening in nature. It can take many forms, including physical, verbal, psychological, and sexual. Examples of harassment may include:

- Verbal harassment: This can include name-calling, insults, and offensive comments or jokes.
- Physical harassment: This can include unwanted touching, pushing, or any other type of physical contact that is unwanted.
- Sexual harassment: This can include any unwanted sexual behavior, such as unwanted touching or sexual comments.
- Cyber harassment: This can include online harassment, such as cyberbullying or harassment through social media platforms. Harassment is a serious issue that can have a significant impact on the victim's mental and emotional well-being,

as well as their professional and personal life. It is important to take any instance of harassment seriously and to report it to the appropriate authorities or support networks. Sexual harassment is a very real issue that went unnoticed for a long period of time, but not anymore. It is essential for all of us to take measures to prevent it from happening as it damages the life of the victim severely. Thus, make sure you help out those who are suffering from sexual harassment and make the people are safe around streets.

### **B) CHILD AND WOMEN TRAFFICKING:**

Child and women trafficking is a serious issue in India and also around the global. Even we cannot leave the children alone in the street and women also cannot travel alone for personal reasons. The majority of trafficking in the country are happening internally because of family background like Dalits, religious minorities, tribal community members and girls from different minority groups as well. Girls around the world are specially in India wants to help the family so they travel from place to place for work and those places can be dangerous. That can take advantages of them like agricultural land

and constructions sites, trafficking is very much common. A lot of cases on women trafficking are also depends on drug edicts. These drug edicts also go for several degraded places put themselves in danger. Cheap labour and slavery have made trafficking in our country are happening frequently and that these children work in places are so horrible. Child and women trafficking is a form of modern-day slavery where individuals are forcefully or fraudulently transported, recruited, or harbored for the purpose of exploitation. This exploitation can include forced labour, sexual exploitation, or other forms of abuse.



Fig.2 Trafficking

Child trafficking involves the recruitment, transportation, transfer, harboring, or receipt of a child for the purpose of exploitation. This can include forcing children into prostitution, domestic

servitude, or other forms of labor. Women trafficking involves the same practices, but with the focus on women and girls. Women may be trafficked for sexual exploitation, domestic servitude, forced labor, or other forms of exploitation. Trafficking of children and women is a serious human rights violation and a global problem affecting millions of people every year. It is a complex issue that requires a comprehensive approach, including prevention, prosecution, and protection. Governments, international organizations, and civil society need to work together to combat trafficking and protect the victims. This includes raising awareness about the issue, strengthening laws and law enforcement efforts, and providing support services to victims. Trafficking women and children are used to working in dangerous places for a lot of illegal activities most of the time such as sexual abuse, slavery, drug selling and domestic work. The society and government need to focus on prevention and protection for women and children. Government should adopt proper measures to prevent kind of trafficking. And government should implement a proper criminal law that people can fear about these kind activities to do.

Awareness in the society has to create by educating and informing people.

### C) KIDNAPPING:

Our society is facing many problems in our world today. Many of these problems appear on news and around our society. These are issues mostly like stealing, crime and immigration which impacts many people in their daily lives because they are experiencing similar issues in their own life. Many times, it's difficult to know how to deal with the issue. Kidnapping, or the unlawful abduction or transportation of a person against their will, is a serious crime that affects both men and women. However, women are often particularly vulnerable to kidnapping due to various societal, cultural, and economic factors. In many cases, women are targeted for kidnapping because of their gender, and are subjected to various forms of violence, including sexual assault, forced marriage, and forced labor. Women and girls may also be kidnapped for ransom, or as part of human trafficking operations. To help prevent women from being kidnapped, it is important to address the root causes of gender-based violence and to provide resources and support to women who may be at risk. This can include providing

education and economic opportunities to women, strengthening law enforcement and justice systems to better address cases of violence against women, and promoting gender equality and empowerment. If you or someone you know is at risk of being kidnapped or has been kidnapped, it is important to seek help immediately by contacting local law enforcement or other relevant authorities.



Fig.3 Kidnaping

Religion can be another cause, since religion may make us do wrong things. It can lead to overshadow in doing the wrong things. Selfishness makes you want everything they have that you don't have and others do. Revenge makes you cause damage, makes you lie, makes you become angry in situations, causes trouble, and stealing to happen. Hate violence you in pieces, makes you want to cheat people,

makes you want to insult. Nearly, 203,000 women and children are abducted each year and mainly, 20-80% are strangers who do this, told by news. The society's biggest problem is kidnappings. Kidnappings have a negative effect on peoples because we cannot even interact with unknown person. Kidnappings often have many causes behind its issue. It can be costly because you would have to pay the price for the release if you were abducted for money or because they were rich, jealous and selfish

#### **D) ABUSEMENT:**

Abuse is when someone is treated with violence or cruelty on a regular/ daily basis. Different types of abuse are physical, emotional, sexual, financial and domestic abuse will be touched upon. It will talk about the different signs, how people may have received these types of abuse, the effects and hoe you can prevent different types of abuse

➤ Physical abuse is when someone acts in a way that may intentionally cause harm to another person. Types and indicators of abuse, physical abuse is scolding and burning, physical punishments.

➤ Sexual abuse is sexual behaviour or a sexual act forced upon a women, man or child without their consent. "Sexual abuse is violence towards someone the attacker believes is weaker than them". It is not a form of an uncontrollable sex drive, but a crime committed with the idea of making the victim feel humiliated. The people who experience sexual violence or abuse can vary. It can affect anyone despite their age, gender, race is sexuality. The abuses could also vary between a stranger, partner, some you may know well.

#### **III. ELECTRIC SAFETY JACKET**

In our society, child women trafficking and harassments has been become one of the global problems. The violations need to be reduced with help of technology. These are several methods applied instantly to escape from brutal situations, such as Pepper spray, Tactical pen, stun guns and Tasers etc. With the help of new electronic gadgets this violation can be reduced some extent, but the limited availability of few technological equipment can't be used extensively. A new technique should be developed which not only cheap but also easily implementable. In this project it is proposed to introduce a safety electric jacket to decrease trafficking, harassments,



kidnaps etc across the world. This jacket comes with major safety factors which depends on person who carries this jacket. Because of selection of good temperature resistive fabric and proper insulation inner side of this jacket. Phase and neutral conductors are placed in fabric with metal click buttons. These two lines are connected to the circuit.

#### WORKING OF ELECTRIC JACKET:

Battery is a source of this jacket and its capacity is 3.8V, 10,000 mah. It is rechargeable battery. As this battery is DC source, we cannot step-up the DC current so here we using oscillator which consist of a transistor (DB82P), capacitor (0.01 $\mu$ f) and resistors (2.5kohms) & (1.5kohms) to DC current to pulsating AC current. After that we used pulse transformer to increase the signal which are generated in the oscillator. The output of the transformer is boosted up using voltage multiplier through the ladder network which consist of diodes and capacitors. This operated by the switch (SPST) in ON and OFF modes.

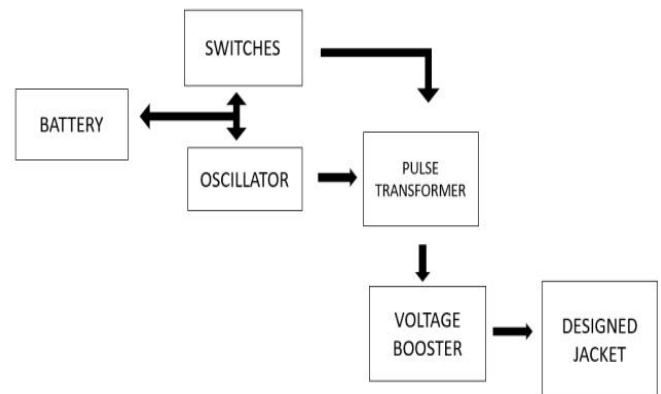


Fig.4 : Block diagram of Electric Jacket

The circuit is connected to our designed jacket. Our designed jacket is made with leather for good insulation from inside of jacket, polyester fabric for less weight, snap buttons and conductor throughout the prepared jacket. So, we have prepared a jacket from fabric and leather. In this jacket we are using leather for inside layer and polyester fabric is used for outside of the jacket. Then we fixed snap buttons throughout the outside layer of the jacket, as we see the safety for user of the jacket, we here are using a leather glove for their own safety to prevent any self-shock circuit

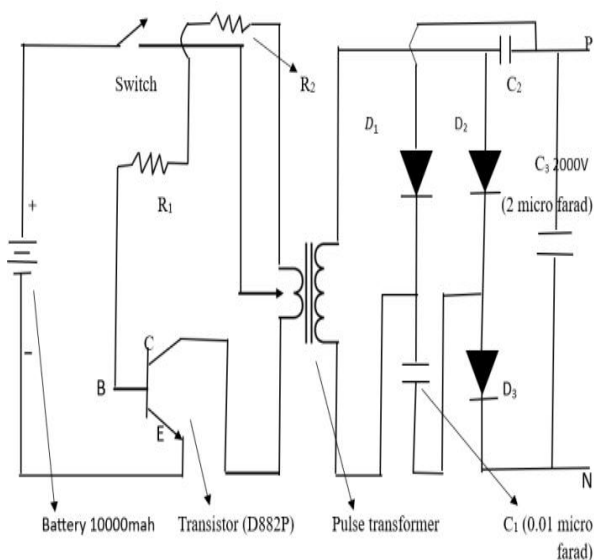


Fig.5 Circuit diagram of Electric Jackets

To get the better impact of shock for attacker we decided to fix the snap buttons within the limit of palm size of our hand. So, these snap buttons are placed in a straight pattern consider as positive. As well as there is another pattern consider negative is vice versa to the positive pattern. As mention above the snap buttons are fixed to outer layer of the jacket in a straight pattern, here conductor is connecting the snap buttons throughout the jacket, those conductors are connected to circuit. These connections are connected in an open loop manner. Our jacket is designed as that is open loop circuit. When anyone touches it, it becomes closed and gets shock to the person.

#### IV. RESULTS AND DISCUSSIONS

We have successfully designed our project of “DESIGN AND DEVELOPMENT OF NOVEL METHODOLOGY FOR ELECTRIC SAFETY JACKET FOR WOMEN.” In this we know that battery is input source, it is a rechargeable battery and with 3.8V, 10000mah.  $P = VI$   $P =$  power  $V =$  voltage  $I =$  current (Battery capacity) 10,000 mah = 10Ah  $V = 3.8V$   $P = (3.8) (10) P = 38$  Watt/hour Power capacity of our battery used is 38 W. The output of this project is, we have spread, phase and neutral wires into 12 parallel lines all over the jacket. The 6 lines with 56 cm length at below the two sides of both shoulders. We have 2 lines with 25cm those are divided by circuit at back of jacket. The next 2 lines are 35 cm length which are placed above the shoulder. Another 2 lines are distance with 65 cm on both hands. So, we have already discussed that our circuit works when is closes, to get shock. The voltage also drops when distance of conductor increases. At starting of the circuit it gives 1300V, when the distance increases its drops to the 415V. The impact of shock may vary but with this shock person can loss muscle control.

Table.1 Impact on body shock

| INPUT   |         | OUTPUT  |         | IMPACT ON<br>SHOCK           |
|---------|---------|---------|---------|------------------------------|
| VOLTAGE | CURRENT | VOLTAGE | CURRENT |                              |
| 3.8 V   | 10 A    | 1300 V  | 0.5 A   | Person can loss m<br>control |



Fig.6 Actual circuit of project

**ADVANTAGES:**

- This jacket is useful for women in different harmful situations.
- It gives instant solution in self-defence purpose.
- This jacket is costly friendly.
- It is made with very good insulation for safety precaution.
- It is also helpful for many harmful situations, that are faced by human beings.
- It is easy to use by everyone.

APPLICATIONS: This jacket is used for

different types harmful situations like harassments, kidnaps, bullying, abusements etc. This is specially designed for women safety.

**V. CONCLUSION**

The Project “Design and Development of Novel Methodology of Electric Safety Jacket for women” has been successfully designed and tested. It has been developed by all suitable hardware components. Every component is each step our project development. By the help of these components, we can operate the jacket by using switch. As we know that our project main aim is for safety purpose of women and other harmful situations. It is open loop type and when a person touches it becomes closed and gets shock. In this manner it is helpful. Overall, the project has successfully accomplished its objectives and provided valuable result as per our imagination. This is helpful for the society from the dangerous situation.

**REFERENCES**

1. <https://www.wired.com/2003/05/shockin-g-new-jacket-hits-street/>
2. <https://www.bbc.com/news/world-latin-america-45207567>
3. [https://en.wikipedia.org/wiki/Stun\\_gun](https://en.wikipedia.org/wiki/Stun_gun)

