Teaser Glove for Women Safety

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Abstract. The main aim of this work is for safety purpose of women using electric shock technology. Smart glove is an electroshock weapon. To override muscle triggering mechanism, low current, high voltage electric discharge is used to give electric shock. The concept used in the electric mosquito bat is used as a major source and fixed in the glove through knuckle fixed in the glove. To achieve an alternating high voltage current, step-up transformer is used. Oscillator and resonant circuit also used in this circuit. It may be powered by one or more batteries. Various factors for output current contact with the target depends on internal circuitry, type of skin, targets resistance, moisture, type of cloth used, electric shock weapon and battery conditions.

1. Introduction
This smart glove is specially and successfully designed to protect women from attackers. This smart glove is compact, light in weight and can easily be carried and the components used in this project are easily available and very economical. This smart glove restrict attackers by gives the shock without killing them. Input supply of 3 V with 3 to 5 Amp is given to the device. Current intensity and output are of the device are range of 100 to 500 mA and 600 V. Other electric shock weapons available for women’s safety are Compact stunt gun, Electric shock pads, Stun belts and Stun shield. This device uses a low current electric discharge and high voltage temporarily to affect muscle functions by giving minor pain without affecting major injury. 1.5 V to 4 V with 3-5 Amp is used as an input supply. Also 100 to 4 kV as output voltage [1]. To monitor human body parameters, Arduino board and sensors are used. For high supplying high voltage shock, Electric circuits are used. Also GPS and GSM modules are used for tracking purpose. The device will send a distress message and location coordinates if any abnormal variations in body sensed and an electric shock will be applied to defend from victims [2]. Uses a sandal to generate shock. An electric shock circuit is safely placed inside the sandal. By triggering a switch it will supplies a shock through the projection tips. Once the sock is generated, a signal will be sent by AVR microprocessor and it sent to GSM device. It will send the coordinate message [3]. Uses a system which cause mild muscle contraction using the gun by stimulating sensor and motor nerves. Due to that the movement of attacker will be restricted. In this system RFID is used as main source and illegal use of the weapon will be prohibited [4]. Uses Arduino as a main source to give signal to the user defined person using GSM module connected to the Arduino. GSM module sends message as a SMS to the pre-defined person’s mobile number with location of victim [5].
2. Components used

2.1. Gloves
The glove is made up of leather, plastic (PVC) and synthetic rubber. It is lightweight and compact design, it can be used by both men and women. Additional bumper is projected at the knuckle portion for our comfort as shown in the figure 1.

![Figure 1. Glove](image)

2.2. Metal Rivet
Metal rivet is made of Silver. They act as an electrode. Silver is a good conductor of electricity due to their movement of free electrons. They are resistant to corrosion. They conduct the current from output terminal of the circuit to the human body.

2.3. Spring for triggering
When spring comes in contact with the opponent, it will be deformed and probe will be projected which in turn touches the human body. Material used for making spring is poly vinyl chloride. It can be deformed up to 5mm.

3. Circuit Diagram

![Figure 2. Circuit diagram](image)

The circuit consists of battery(3V), resistors(1MΩ), capacitors, step up transformer, transistor, diodes, led and switch. The ladder network consists of 3 diode and 3 capacitor boosts the voltage from 140V to 600 V. The battery used is chargeable by AC 230V as shown in the figure 2.
4. Design calculations

4.1. Stiffness of a spring

\[ k = \frac{Gd^4}{8D^3n} \]

Where,
- \( G \) – Rigidity modulus \((N/mm^2)\)
- \( d \) – Wire diameter \((mm)\)
- \( D \) – Coil diameter \((mm)\)
- \( n \) – No. of active coils

**Measurements:**

Diameter of a wire \((d)\) = 2 mm
Outer diameter of a coil \((Do)\) = 18 mm
Diameter of coil \((D)\) = \( D_o - d = 18 - 2 = 16 \) mm
Young’s modulus of elasticity = 2.4 Gpa
Poisson’s ratio = 0.4
Active coils \((n)\) = \((\text{Length of a spring} / d) - 1\)
\[= (16/2) - 1\]
\[= 7\]

Rigidity Modulus \((G)\) = \[\frac{E}{2(1+\nu)}\]
\[= \frac{(2 \times 10^3)}{2(1+0.4)}\]

Stiffness of a spring = \[k = \frac{Gd^4}{8D^3n}\]

\[\frac{(857 \times 2^4)}{(8 \times 16^3 \times 7)}\]

\(K = 52.3 \text{ N/m}\)

Force required to deform a spring \((F)\) = \(k \times \Delta x\)

Where \(\Delta x\) is the deformation produced by the spring,

\[\Delta x = 5 \text{ mm}\]

\[F = 52.3 \times 0.005\]

\[F = 0.2615 \text{ N/mm}^2\]

5. Conduction of electric current through human body

**POWER SUPPLY \(\rightarrow\) TASER GLOVE \(\rightarrow\) METAL PROBES \(\rightarrow\) HUMAN BODY**

Human body acts as a conductor and the short circuit current from taser glove passes through it. 20mA of current causes paralysis of respiratory muscles and 100mA causes ventricular fibrillation threshold and maximum current human can grasp is 16mA.

6. Working

The circuit set up of this taser consists of a electric rechargeable battery and a circuit board. The circuit of this taser is made up of an electric oscillator, a step up transformer, a voltage multiplier and a
charging unit charges the electric battery. The circuit gets power from an electric rechargeable battery. The input voltage has been stepped up from 3v to 140v by the step up transformer which has 30 turns in primary winding and 1400 turns in secondary windings. The ladder network consists of 3 diodes (IN4007) and 3 capacitors which in turn raises the voltage from 140v to 630v. The output terminal in the circuit is connected with the two silver probe as shown in figure 3 (a). Once the switch button in the knuckle part of the hand is triggered the short circuit develops and the short circuit current passes through the human which makes them to feel a sudden jerk and the muscle contradicts. Circuit connections are shown in the figure 3 (b).

![Fabricated Glove and Circuit Diagram](image)

**Figure 3.** (a) Fabricated Glove (b)Circuit Diagram

7. Conclusion
Our model for women safety from attackers can be carried easily due to its compactness. Also the components used are available at low cost. This system is mainly concentrated and developed as water proof system. In future work, implementation of GPS and GSM technologies will be there to make this device as more efficient. By using the GSM and GPS module, it will send the location of the attackers to the predefined number with warning message. By implementing this GPS and GSM, the glove cost will be increased and many people are not able to buy at that cost. It costs around 1000 rupees. Due to its easy construction and affordable price we have fabricated this taser glove.

8. References
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