

# Development of Anti-Riot Electric Shield for Defence Agency

Mr. Abhijeet Vinayak Solanke<sup>1</sup>, Mr. Hitesh Deochand Chandewar<sup>2</sup>, Mr. Aditya Shivshankar Dhoran<sup>3</sup>  
Mr. Shrunkhal Sudhir Bambode<sup>4</sup>, Ms. Prachi Keshao Chafale<sup>5</sup>,  
Ms. Homeshwari Chandrakant Deotale<sup>6</sup>, Mr. Vijay Karale<sup>7</sup>

Students, Bachelor of Electrical Engineering<sup>1,2,3,4,5,6</sup>

Guide, Bachelor of Electrical Engineering<sup>7</sup>

Shri Sant Gajanan Maharaj College of Engineering Shegaon, Maharashtra, India

**Abstract:** *The invention provides an antiriot shield. The antiriot shield comprises an arc-shaped insulating shield body, wherein a plurality of first metal conductive sheets are vertically fixed on the outer wall of the arc-shaped insulating shield body; a second metal conductive sheet is fixedly arranged between every two first metal conductive sheets; a plurality of positive electrode nails are fixedly arranged on the first metal conductive sheets; the second metal conductive sheets are fixedly provided with a plurality of negative electrode nails which are connected with a positive electrode and a negative electrode of a high-voltage power supply by lead wires respectively; the high-voltage power supply is arranged in an insulating handle and the insulating handle is fixed on the inner wall of the arc-shaped insulating shield body. The antiriot shield has good antiriot performance and is safe and reliable; damages on lives are not caused; the antiriot shield has light weight and is convenient to carry and easy to control.*

**Keywords:** Battery charger, charging station, electric vehicle, standards

## I. INTRODUCTION

### 1.1 Background

An anti-riot electric shield is a type of non-lethal weapon used by police and other law enforcement agencies to control and subdue individuals in situations where the use of deadly force is not warranted. The anti-riot electric shield typically consists of a large, flat panel made of conductive material that is capable of delivering an electric shock when it comes into contact with a person. The shield is powered by a rechargeable battery, and the shock is delivered through a set of electrodes located on the front of the shield.

When activated, the electric shield sends a high-voltage, low-amperage electric shock through the person's body, causing involuntary muscle contractions and rendering them momentarily incapacitated. The shock is designed to be painful but not lethal, and its effects typically wear off within a few minutes.

Anti-riot Electric shields are typically used in situations where police need to subdue a person who is resisting arrest or posing a threat to themselves or others. They are often used in conjunction with other non-lethal weapons, such as pepper spray or Tasers, and are considered to be a valuable tool in maintaining law and order while minimizing the risk of serious injury or death to both suspects and law enforcement personnel.

### 1.2 Problem Statement

Riots are today a part of every civilized society, Disagreement for government decisions, religious intolerance, events, hateful content etc. are some of the many reasons that can easily spark riots to handle a riot police, and army must be able to pacify/disperse the crowd without harming them.

This is the major problem with riot control situations, rioters do not listen to any announcements and need to be handled with force which leads to injuries or even deaths of rioters as well as police.

## II. LITERATURE REVIEW

### 2.1 Antiriot Shield (CN104329992A China):

#### Introduction:

The invention provides an antiriot shield. The antiriot shield comprises an arc-shaped insulating shield body, wherein a plurality of first metal conductive sheets are vertically fixed on the outer wall of the arc-shaped insulating shield body; a second metal conductive sheet is fixedly arranged between every two first metal conductive sheets; a plurality of positive electrode nails are fixedly arranged on the first metal conductive sheets; the second metal conductive sheets are fixedly provided with a plurality of negative electrode nails which are connected with a positive electrode and a negative electrode of a high-voltage power supply by lead wires respectively; the high-voltage power supply is arranged in an insulating handle and the insulating handle is fixed on the inner wall of the arc-shaped insulating shield body. The antiriot shield has good antiriot performance and is safe and reliable; damages on lives are not caused; the antiriot shield has light weight and is convenient to carry and easy to control.

The technical scheme adopted is:

A kind of riot shield, comprises cambered surface insulation shield body and high voltage source, it is characterized in that: On the outer wall of cambered surface insulation shield body, be longitudinally fixedly installed multiple first metallic conduction sheet, between every two the first metallic conduction sheets, be fixedly installed a second metallic conduction sheet. Each first metallic conduction sheet is fixed with multiple conical anode electrode nail.

Each second metallic conduction sheet is fixed with multiple conical negative electrode nail. The positive pole of high voltage source is connecting after binding post on multiple first metallic conduction sheet is connected by wire. The negative pole of high voltage source is connecting after binding post on multiple second metallic conduction sheet is connected by wire. High voltage source is arranged in insulated handle, and the two ends of insulated handle are fixedly connected with respectively by the insulate inner wall of shield body of insulation strut and cambered surface. Insulated handle is provided with power switch, on the wire that the voltage output end that power switch is serially connected in high voltage source is connected with the first metallic conduction sheet. The inner wall of cambered surface insulation shield is provided with restraint zone. For being enclosed within an arm of policeman during use.

#### Advantages of this invention:

- Safe and reliable, cannot damage life, lightweight, easy to carry, easily manipulate.
- Avoid and the human contact caused a riot, sharp-pointed electrode nail thorn people, serves the effect of barbed wire, and maintains distance.
- Can disperse riot personnel, electrode nail can send strong electric discharge sound, hides the instinct that electric shock is riot personnel
- Ruffian holds fierce tool when attacking policeman, can anxious time bib, bib is sharp electrode nail touching ruffian health simultaneously, and high-voltage electric shock released by electrode nail makes ruffian faint in short-term, loses violence.
- Several policeman personnel riot shield starts electric shock simultaneously, can send the huge electric shock sound, can produce very large deterrent effect to ruffian.
- When arresting the criminal of hand-held cutlery, available riot shield of the present invention is contained, and electric shock is implemented in touching by force, criminal is fainted in short-term, arrests smoothly.

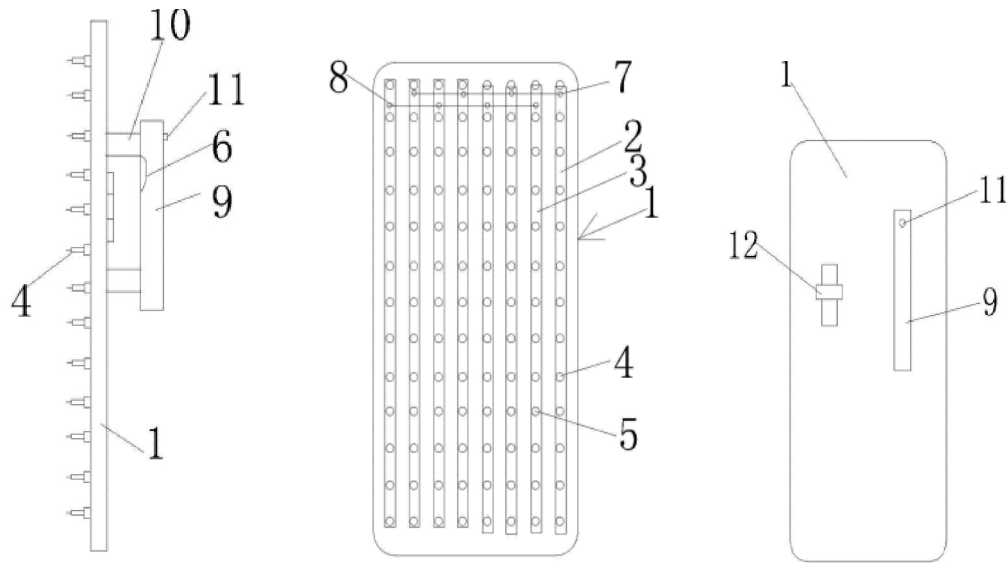


Fig.1 Structural representation of the invention.

Detailed description of the invention:

A kind of riot shield, comprises cambered surface insulation shield body 1 and high voltage source 6, it is characterized in that:

- On the outer wall of cambered surface insulation shield body 1, be longitudinally fixedly installed multiple first metallic conduction sheet 2, between every two the first metallic conduction sheets 2, be fixedly installed a second metallic conduction sheet 3.
- Each first metallic conduction sheet 2 is fixed with multiple conical anode electrode nail 4.
- Each second metallic conduction sheet 3 is fixed with multiple conical negative electrode nail 5.
- The positive pole of high voltage source 6 is connect after binding post 7 on multiple first metallic conduction sheet 2 is connected by wire. The negative pole of high voltage source 6 is connect after binding post 8 on multiple second metallic conduction sheet 3 is connected by wire.
- High voltage source 6 is arranged in insulated handle 9, and the two ends of insulated handle 9 are fixedly connected with respectively by the insulate inner wall of shield body 1 of insulation strut 10 and cambered surface. Insulated handle 9 is provided with power switch 11, on the wire that the voltage output end that power switch 11 is serially connected in high voltage source 6 is connected with the first metallic conduction sheet 2.
- The inner wall of cambered surface insulation shield body 1 is provided with restraint zone 12, for being enclosed within an arm of policeman during use.

## 2.2 SecPro Anti-Riot Shield for Riot Control:

### Introduction

Riot Shields protect the user from melee attacks with blunt or edged weapons and also thrown projectiles. SecPro Stun Tech Anti-Riot Shield is a non-lethal deterrent that's ideal for passive crowd control, VIP protection and entry shield. These **Riot Shield** protect person from the top of the head to the knees, durable and lightweight protection device from melee attacks with blunt or edged weapons and also thrown projectiles.

### Riot Shield Features:

- Designed to quell a riot or a disturbance with electric shock
- Structured with shatter-resistant clear poly-carbonate
- Protects body safely and completely from the impact of stones or stick and from the threat of acid or incendiary liquid
- Transparent poly-carbonate sheet providing wide vision.

**Application:**

Electrified Shields are designed to deter, to Defend and to protect with non-lethal application able to restore law and order with LESS THAN LEATHAL force.

Used by:

Prison Cell extractions, Tactical Police units and General Security Contracting companies.

**Energizer and construction:**

1. IEC tested non-lethal effective electronic shocking device with an open discharge output of +- 80,000 volts at an average current of less than 1 milliamp.
2. Lightweight aluminium metal strips, dim 19mm (wide) x1.8mm (thick) securely fixed with new insulated nylon studs. Each stud fitted with an insulated nylon washer on the inner face of the shields and strategically placed in 6x2 pattern over the front area of shield including outer rim forms the grid through which the non-lethal shock is conducted.
3. Protective pinch-edged black beading securely fitted around the shield edge
4. Activation of shock is by heavy-duty self-return thumb operated momentary switch conveniently situated for activation in the moulded hand grip to allow for continuous rapid deterrent response.
5. Include SAFETY KILL switch with wrist strap and 125DB siren activated in the event of an emergency should the official be disarmed and simulates rendering the shield harmless.
6. All EPS STUNTECH shields are fitted with sealed detachable control box for easy maintenance which houses all electronics including a battery pack ON/OFF switch and standby ON indicator.
7. Dual Visible test spark at pre-determined location in front of the shield ensures Effective intermittent dual test spark deterrent for would-be aggressors.  
Low battery indicator i.e. test spark weak and slow; battery needs to be charged.
8. Fully charged battery will continuously operate the shock for up to 1 000+ quarter second bursts.
9. Standby time approx. 500 + hours including centre Nylon Webbing belt support strap.

**III. METHODOLOGY**

Designing an anti-riot electric shield requires careful consideration of both the intended use and potential safety concerns. Here is a general methodology for creating such a shield:

- Identify the purpose: Determine the intended use of the shield. Is it meant to disperse crowds, protect law enforcement officers, or both?
- Choose the appropriate materials: The shield should be made of a non-conductive material such as polycarbonate or fiberglass. The material should be strong enough to withstand impact and be lightweight enough for easy maneuverability.
- Determine the size and shape: The shield should be large enough to provide adequate protection for the user, but not too large that it becomes cumbersome to handle. The shape should be designed to maximize protection while maintaining visibility.
- Incorporate an electric component: The shield should include an electric component that can be activated to repel attackers or disperse crowds. This can be achieved using a stun gun or a Taser-like device.
- Include safety features: The electric component should include safety features such as a trigger lock or safety switch to prevent accidental activation.
- Test and refine: The shield should be tested in a controlled environment to ensure its effectiveness and safety. Refine the design as necessary to improve its performance.
- Train users: Law enforcement officers who will be using the shield should receive proper training on how to use it safely and effectively.

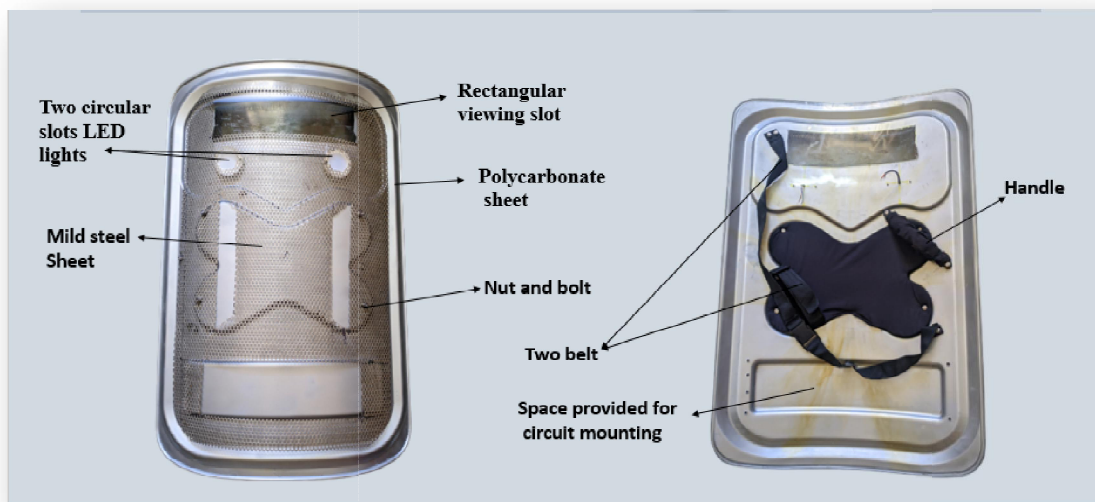
It's important to note that the use of an electric shield in riot control can be controversial, and there may be legal and ethical considerations that need to be addressed before implementing such a device.

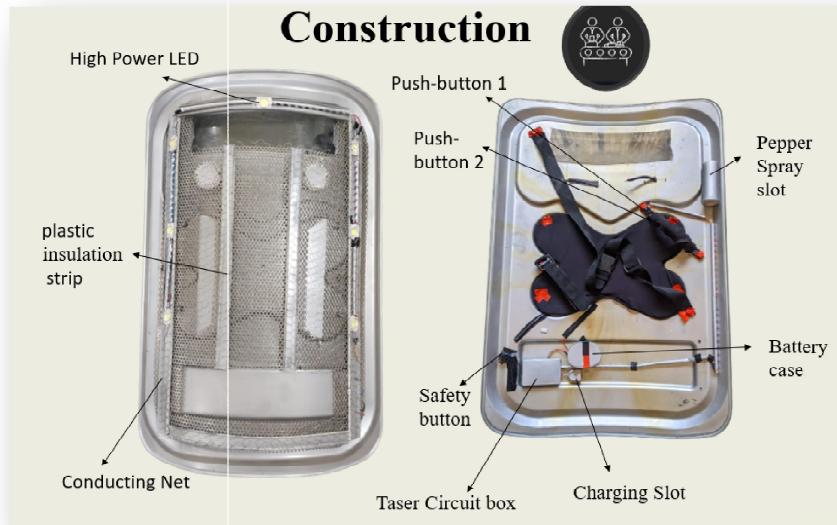
#### IV. DESIGN MODEL

Designing an anti-riot electrical shield requires careful consideration of various factors such as the materials used, the size and weight of the shield, and the electrical components used to create the shock feature. Here's a basic design model to get you started:

- **Shield Material:** The shield should be made of a strong, lightweight material such as polycarbonate or aluminum. It should be able to withstand impact and be resistant to corrosion.
- **Handle Design:** The handle of the shield should be ergonomically designed to allow for a secure grip, even when wearing gloves. It should be made of a non-conductive material to prevent electrical shock to the user.
- **Electrical Components:** The electrical components of the shield should be designed to deliver a non-lethal electrical shock to deter attackers. The voltage should be high enough to incapacitate the attacker, but not so high as to cause permanent injury. The components should be designed to ensure the safety of the user as well.
- **Battery:** The shield will require a rechargeable battery to power the electrical components. The battery should be able to deliver enough power for several uses before needing to be recharged.
- **Charging System:** The charging system should be designed to allow for easy and safe recharging of the battery. It should be able to charge the battery quickly and have a built-in safety feature to prevent overcharging.
- **Size and Weight:** The shield should be large enough to provide adequate protection, but not so large as to be cumbersome. It should be lightweight enough to allow for easy maneuverability, but sturdy enough to withstand impact.
- **Additional Features:** Depending on the specific requirements of the shield, additional features may be added such as a flashlight, camera, or radio.

Overall, designing an anti-riot electrical shield requires careful consideration of the materials used, the size and weight, and the electrical components used to create the shock feature. The safety of the user should be the top priority, and the shield should be designed to be effective in deterring attackers while also being easy to use and maintain.





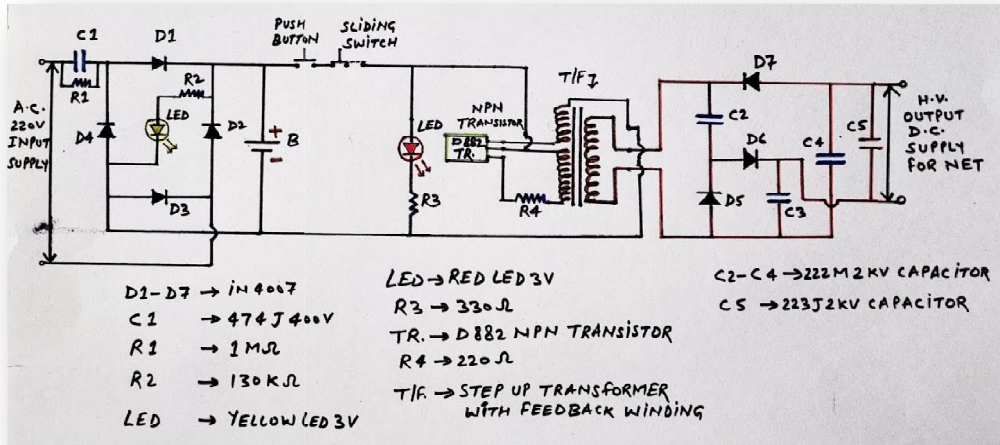
## V. WORKING

An anti-riot electric shield is a type of shield that is designed to protect law enforcement officers from violent protesters or rioters. It is equipped with an electric shock feature that is meant to deter aggressors from attacking or attempting to grab the shield. The shield is typically made of lightweight and durable materials, such as polycarbonate or high-density polyethylene, and is reinforced with metal or carbon fiber for added strength. The electric shock feature is powered by a battery that is integrated into the shield. When activated, the electric shock feature generates a high-voltage electrical charge on the surface of the shield. This charge is delivered to anyone who comes into contact with the shield, causing a painful electric shock that can incapacitate or deter an attacker. The amount of voltage delivered by the shield can be adjusted, depending on the situation and the level of force needed to subdue an aggressor. The shield is also equipped with safety features, such as a lockout switch that prevents accidental discharge, and a safety timer that limits the amount of time the electric shock can be delivered to a single person. Anti-riot electric shields are primarily used by law enforcement agencies and security forces in riot control situations.

While they can be an effective tool for preventing violence and protecting officers, their use can also be controversial and has been subject to criticism from human rights groups

A Taser circuit: This is a type of stun gun circuit that is designed to generate a high voltage, low current electrical shock. It typically consists of two main components: a voltage multiplier circuit and a control circuit.

The voltage multiplier circuit is responsible for boosting the input voltage to a much higher output voltage. It usually consists of a series of capacitors and diodes that are connected in a ladder-like configuration. When a high-voltage pulse is applied to the input, the capacitors charge up and discharge through the diodes, causing the voltage to multiply with each stage. The control circuit is responsible for triggering the voltage multiplier circuit and regulating the output voltage and current. It typically consists of a microcontroller, a pulse generator, and a feedback loop. Which generates a series of high-voltage pulses that are fed into the voltage multiplier circuit. The feedback loop monitors the output voltage and current and adjusts the pulse generator to maintain a consistent output. When the stun gun is fired, the high voltage pulses generated by the pulse generator are fed into the voltage multiplier circuit, which multiplies the voltage to several tens of thousands of volts. The resulting electrical shock is delivered to the target through two electrodes that are usually mounted on the end of the stun gun. The high voltage shock causes muscle contractions and disorientation in the target, making it an effective non-lethal weapon for law enforcement and self-defense. However, it is important to use a Taser circuit with caution and follow proper safety guidelines, as it can be dangerous if misused.



## VI. CONCLUSION

- To avoid injuries to military and police force personnel during riot control incidents, a polycarbonate shield has been developed.
- To solve this issue we here design a smart Anti-riot shield that allows police personnel repel/arrest rioters without harming themselves or the rioters. Thus the lightweight Anti-riot shield is a smart combination of blinders, pepper spray and metal+ Kevlar protection to provide a solution to riot control.

## VII. RESULT

General specifications of Anti-riot electric shields used by law enforcement and security personnel:

- Material:** The shield is typically made of a strong and durable material such as polycarbonate or high-density plastic.
- Size:** The shield is generally larger than a standard riot shield, measuring approximately 3-4 feet in height and 2-3 feet in width.
- Weight:** The weight of an electric shield can vary, but it is typically heavier than a standard riot shield due to the added components required to generate the electric charge (between 4 to 5 kg.)
- Voltage and Current:** The electric shield generates a low-level electric charge, typically ranging from 1000 to 5000 volts, with a current output of less than 10 to 30 milliamps.
- Battery Life:** The battery life of an electric shield can vary depending on the frequency of use, but it is typically designed to last for several hours of continuous use.
- Additional Features:** Some electric shields may come equipped with additional features, such as a built-in flashlight or Pepper Spraying for blinding rioters who come close to attacking the police.

It is important to note that the use of electric shields, like any non-lethal weapon, should be subject to strict guidelines and oversight to ensure that they are used appropriately and in a proportionate manner to the threat faced

## REFERENCES

- [1]. Express news service New Delhi | Updated: December 28, 2019 7:06:21 am
- [2]. Flaccus, Gillian (July 26, 2020). "On Portland's streets: Anger, fear, and a fence that divides". Seattle Times. Retrieved October 3, 2020.
- [3]. <https://youtu.be/QZFQOPcrVkc>
- [4]. <https://patents.google.com/patent/CN104329992A/en>
- [5]. <https://projectsgeek.com/2018/02/traffic-signal-monitoring-controlling-system-iot-project.html>
- [6]. <https://www.securityprousa.com/products/riot-gear-stun-tech-anti-riot-shield>
- [7]. <https://patents.google.com/patent/CN104329992A/en>

[8]. <https://youtu.be/f-AlgMeMrEk>

[9]. <https://youtu.be/eq3q9lxzZsc>