

Triboelectric Running vest

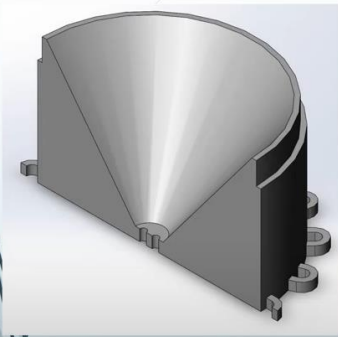
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2 Problem Statement



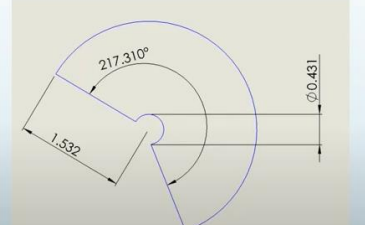
- Running Along a Road
- Running in the Dark
- Safety Vests
- Replace or Recharge Batteries
- Other Methods for Power

13 Design



LED Holder Section View

- LED Holder Design
 - Rings for Sewing to Vest
 - Reflective Sheet Designed with Sheet Metal Calcs
 - Lens on Top



Reflective Sheet Cutout

4 Solutions

- Utilize the Runner's Motion to Create Power
- Utilize Blinking Lights to Enhance Visibility
- Utilize Low-Cost Materials
- Utilize Recent Advances in Technology, Specifically Triboelectrics



14 Fabrication



Fabricated LED Holder

- Generator and LED Fabrication
 - 3D Printing using ABS
 - Scotch Tape and Super Glue Adhesives
 - Conductive Copper Tape and Solder

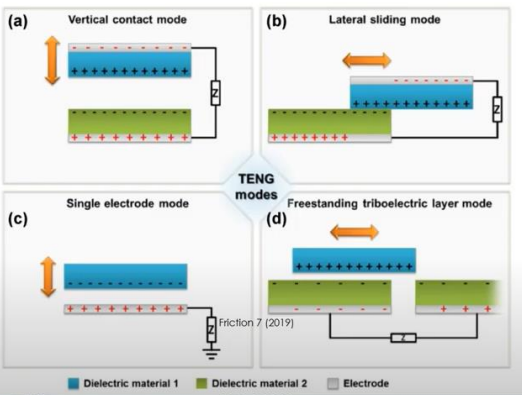


Fabricated Generator Unit



Full Generator All Connected

8 Background



Types of Triboelectric Generators

15 Fabrication

- Fully Assembled Vest
 - Generator Attached to Vest Using Pouch
 - LED Cones Sewn onto Vest
 - Generator Covered to Protect From Weather
- Running with the Vest
 - Weight can be felt, doesn't restrict movement



Rear View of Vest

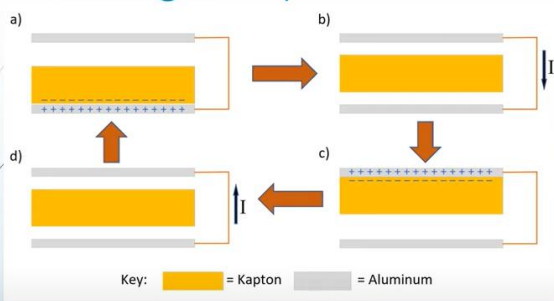


Front View of Vest



Running with the Vest

10 Working Principle



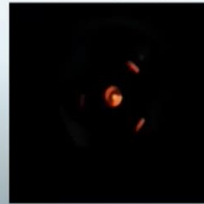
Generator Analysis with Stride

- Triboelectric Design – Freestanding Vertical Contact
 - A) Feet On Ground and Begin Ascent
 - B) Moving Towards Top of Stride
 - C) Top of Stride and Begin Descent
 - D) Foot Touches Ground

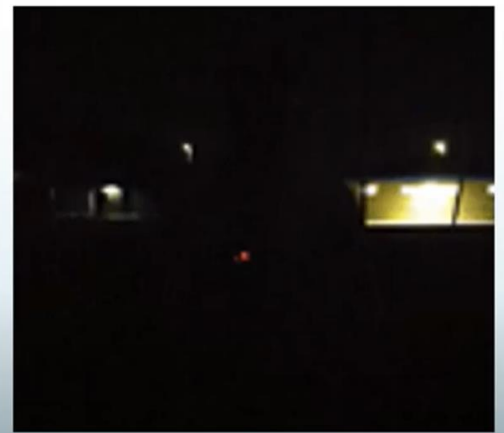
16 Results



LED with Lighting

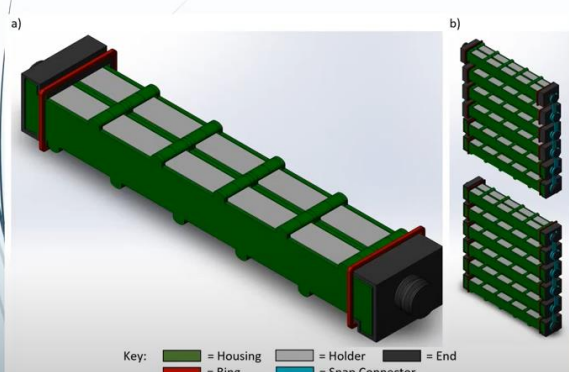


LED in the Dark



LED in the Dark w/ Backlighting

12 Design



Generator Units and Full Generator

- Full Generator
 - 12 Units of 2 Generators, 24 Total Generators
 - Snap Connectors Designed to Swivel
 - Measures 1.5" X 7" X 14"

19 Summary

- Developed a Product that Improves the Safety of Runners at Night without the Need for Batteries
- Designed a Triboelectric Generator that Utilizes the Motion of a Runner's Stride
- Fabricated Generator and Attached Generator and Lights to Vest
- Tested Generator for Optimal Conditions and Sight Distance
- Optimal Conditions Determined to be 3 Hz (180 Steps per Minutes)
- Can be Seen up to 120ft Away