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# Electroluminescent Technology

- Large battery
- High voltage
- Mobility issues

New Dress

- Lightweight, low voltage
- Mobile
- Has to be robust and durable

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# Introduction

- Significant research into PE
- Challenges:
  - Low mobility
  - Short lifetime
  - Feature size realisation
- Inorganic semiconductors
  - Direct layer by layer approach
  - Self-assembly of fabricated devices
  - Pad printing of fabricated devices
- A novel solution

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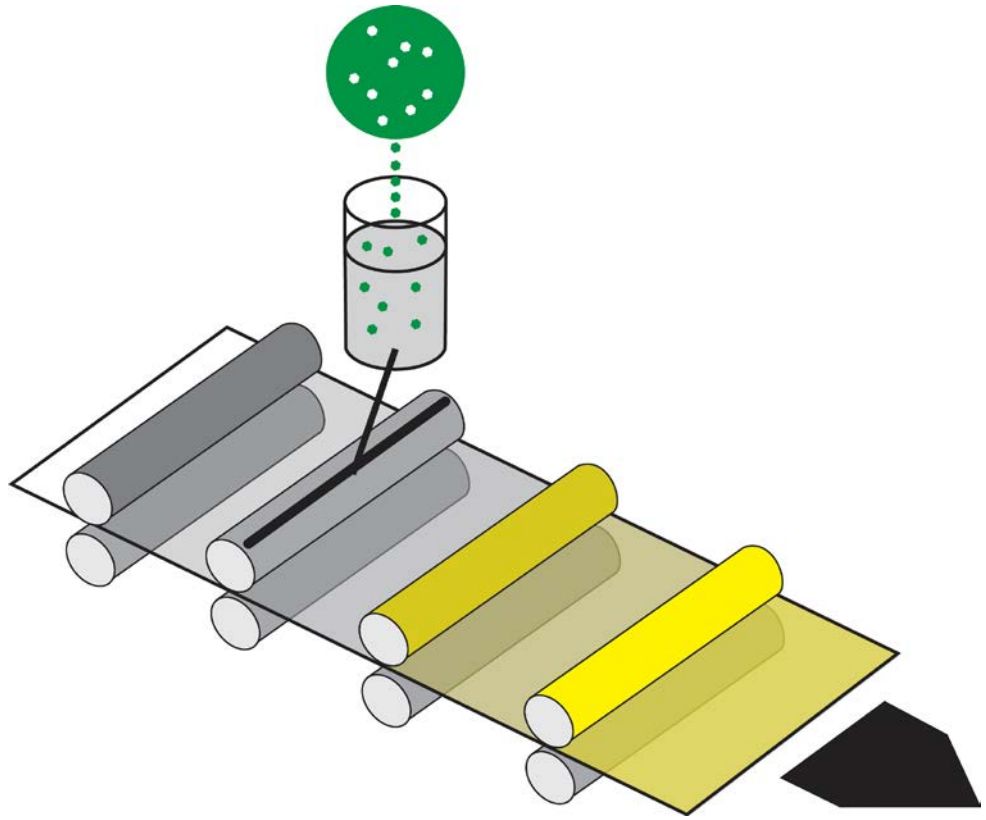
# Printable Inorganic Micro LEDs

- 27um blue emitting LEDs
- Polyester Ag
- Design for functional
- Preferential direction
- Distribution



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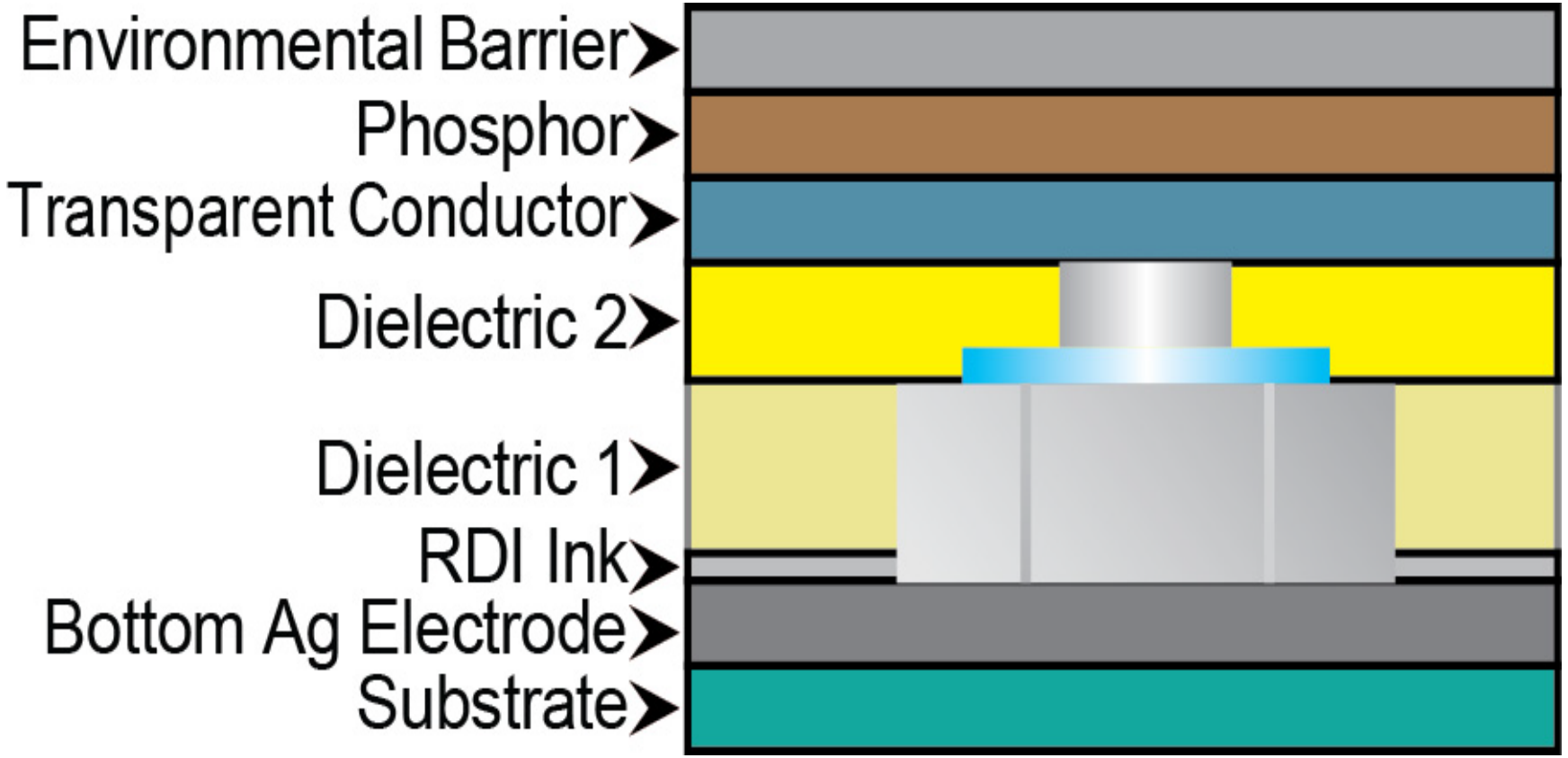
# Printable Inorganic Micro LEDs



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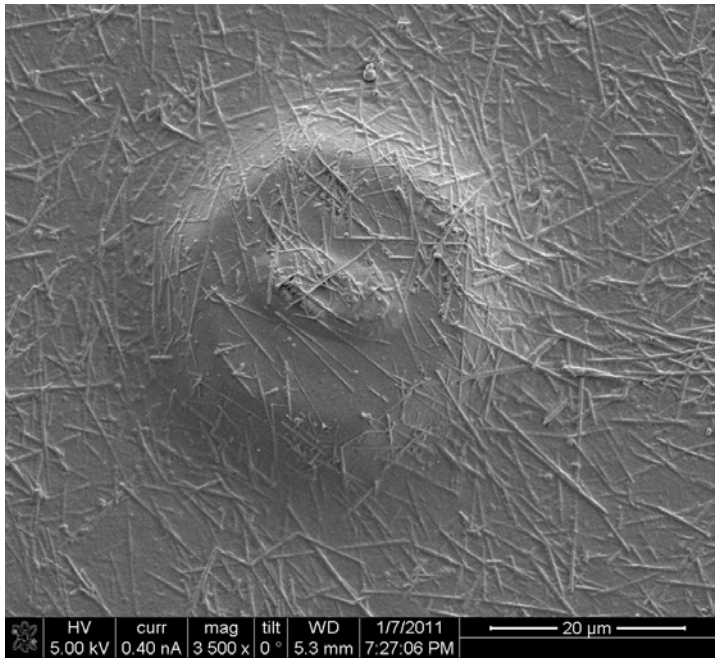
# Printable Inorganic Micro LEDs




SEM of a printed micro LED with a nano-fibre transparent conductor (one-shot transmission T=~97 %, and resistance 50 Ω)

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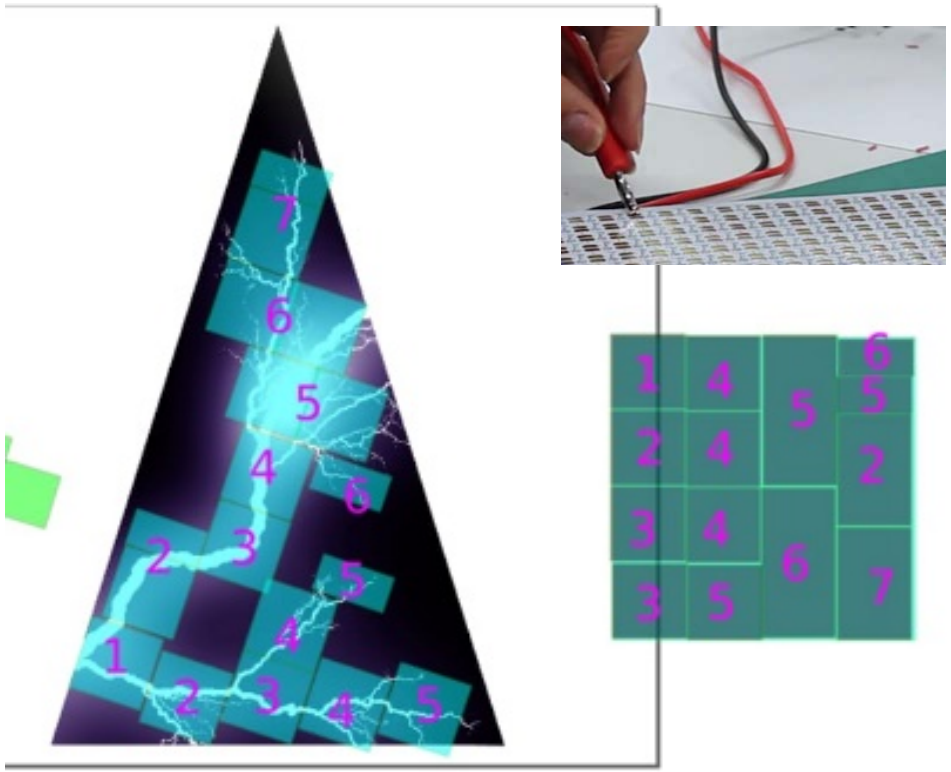
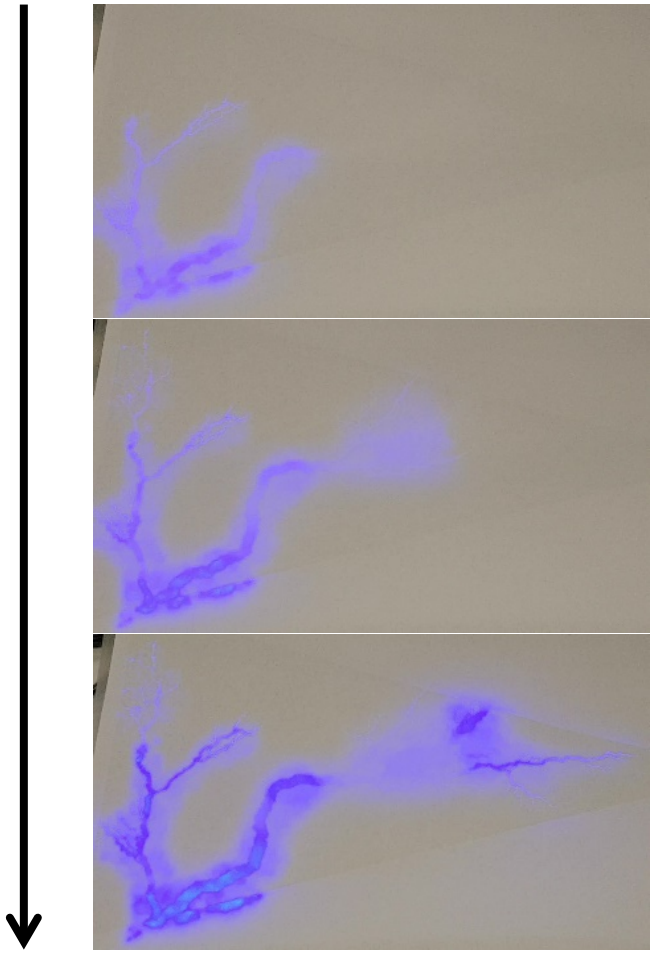
# Application to Wearable Technology





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# Application to Wearable Technology

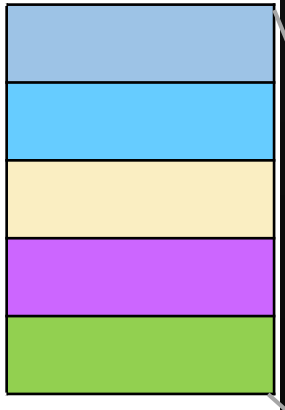
**Printed Image**

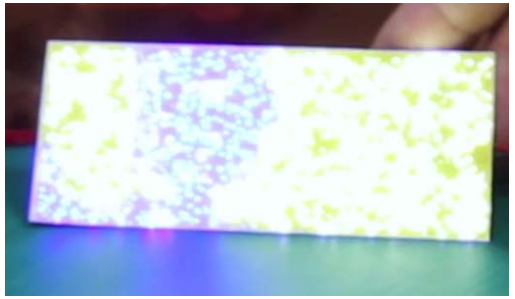
**Vinyl with Thunderbolt Cut-out**

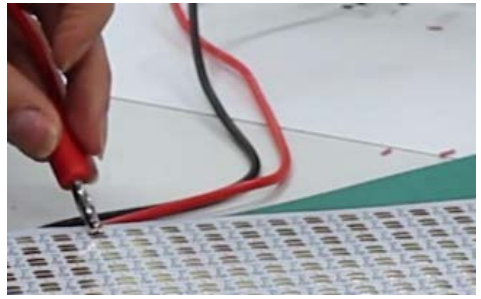
**Light Diffusing**

**Printed LEDs**

**Electronic Wiring**







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# Graphics

Aim:

- Diffusion of light
- Bleed through
- Stitching
- Rigidity
- Graphic quality
  - PVC
  - Vinyl
  - Vinyl Laminate
  - Vinyl PET

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# Electronics Design

- All panels to be wired in parallel
- LiPo battery to provide power for the panels
- Arduino controlled
- Charged via USB lead
- PWM waveform output to smooth flash sequence

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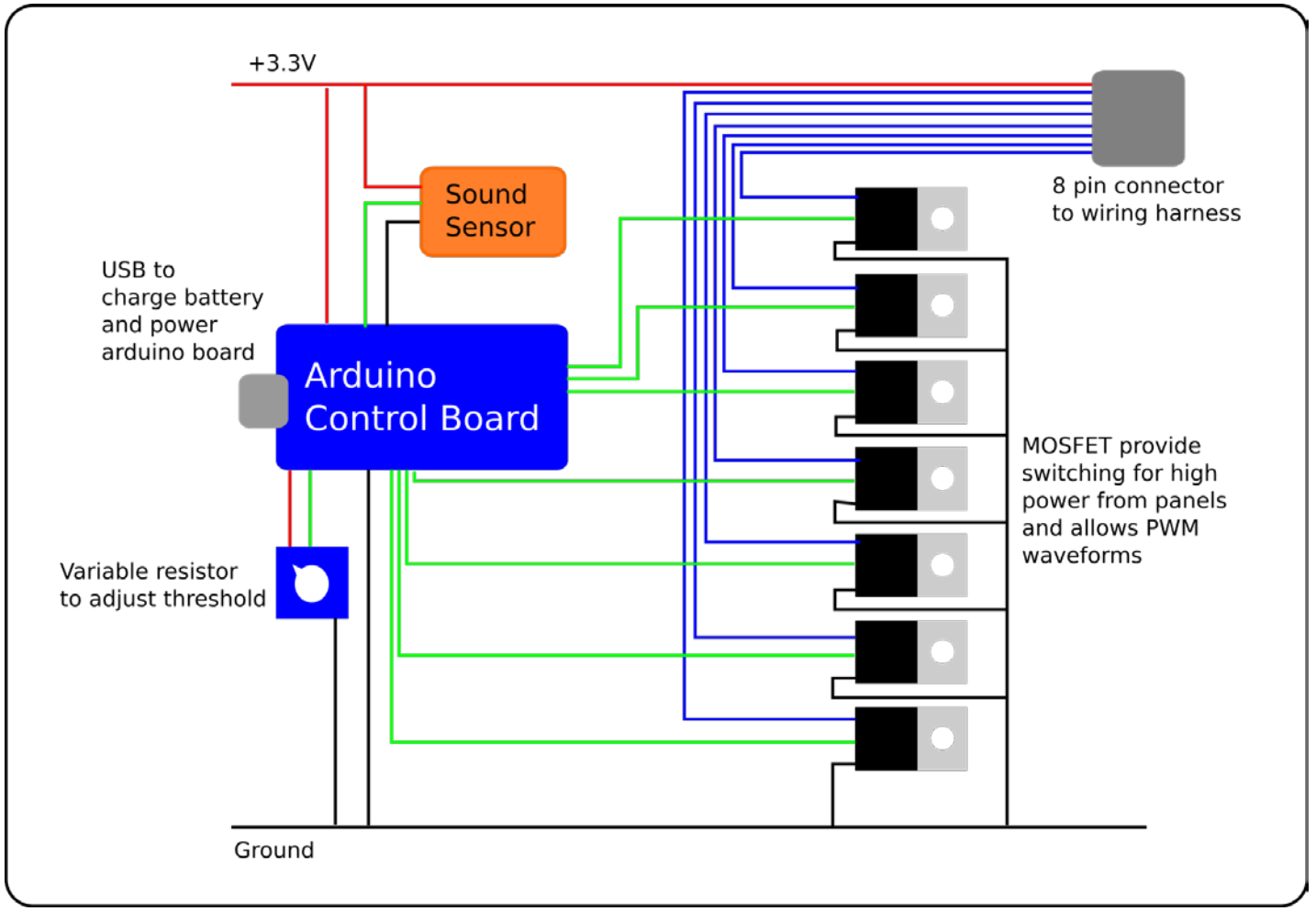
# Electronics Hardware Schematic



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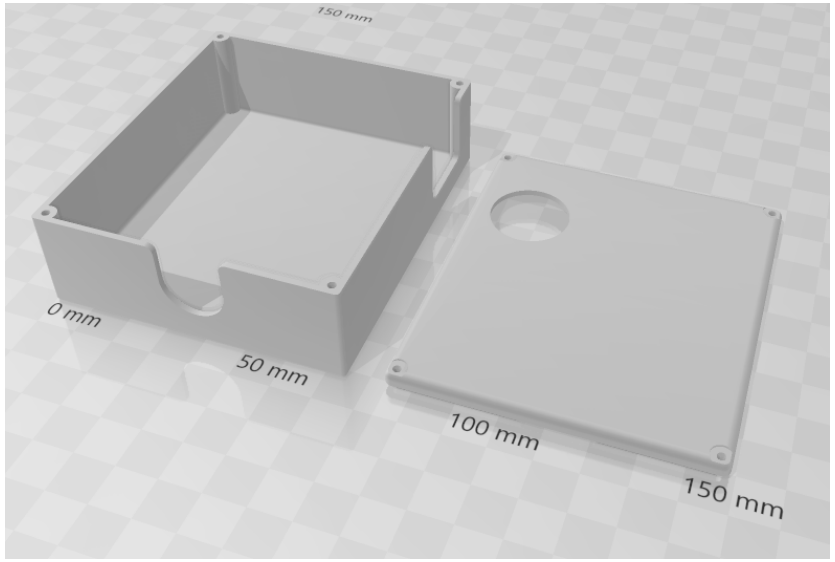
# Housing for the Electronics




- 3D printed from PLA
- Access point for USB
- Attachment point for 8 pin connector to wiring harness
- Screws to hold lid in place and allow access to electronics
- Hole in the lid above sound sensor

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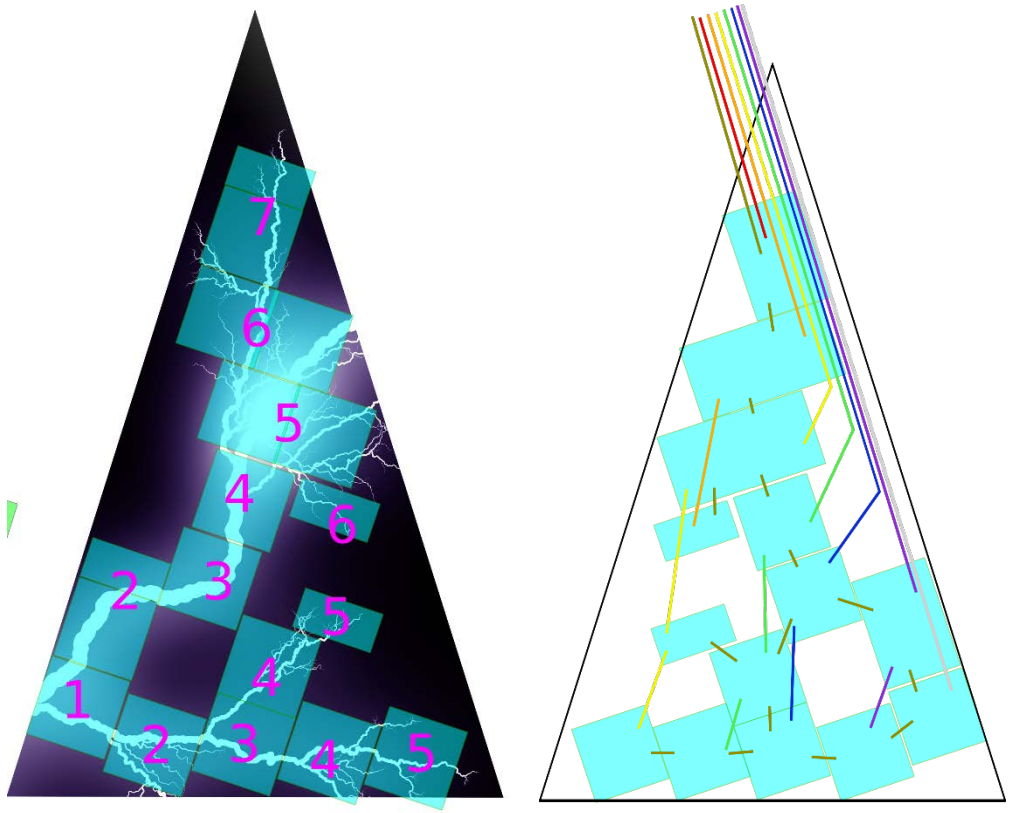
# Panel Layout and Wiring




- Flash broken into 7 sections
- Each section has it’s own ground line
- All sections run from a common positive line
- A total of 8 wires to fit a standard 8 pin connector

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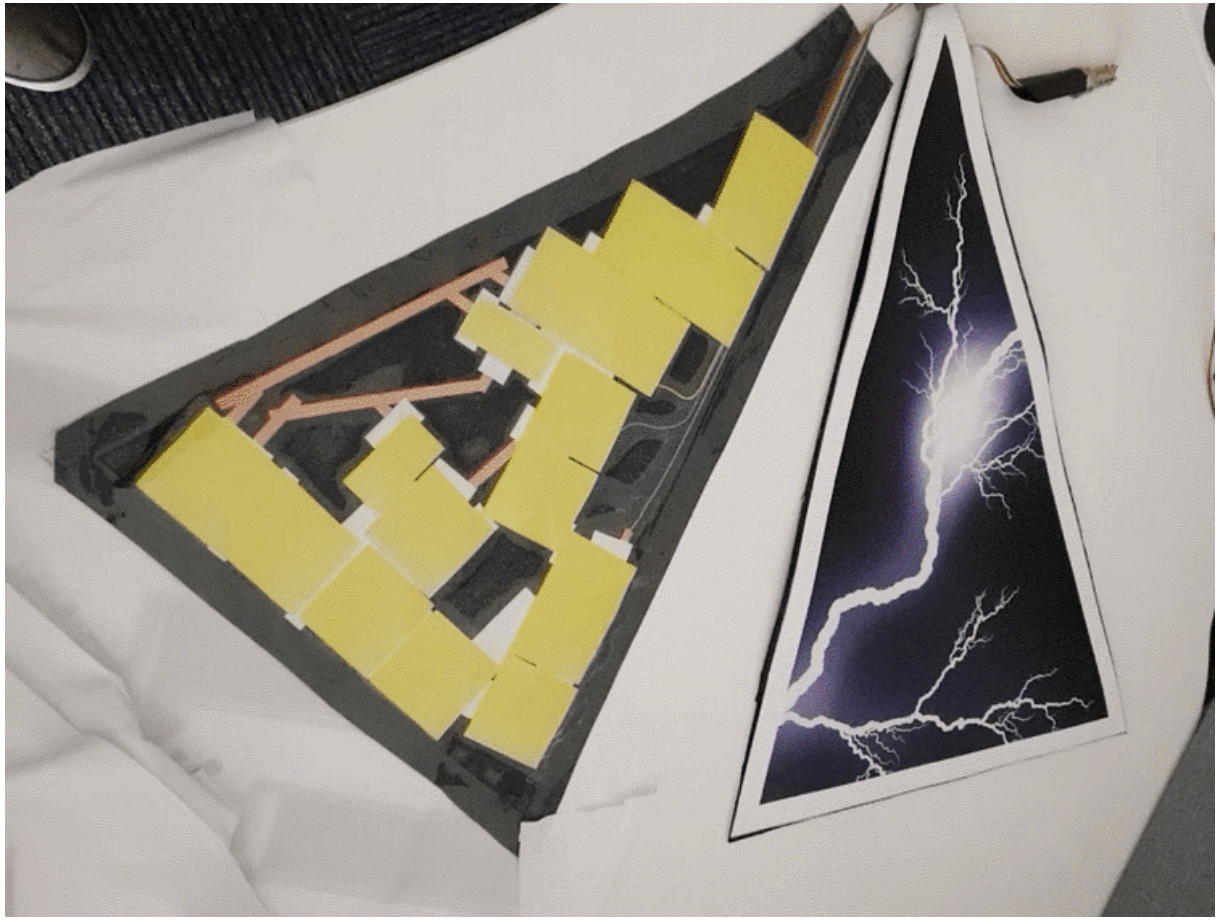
# Panel Layout and Wiring



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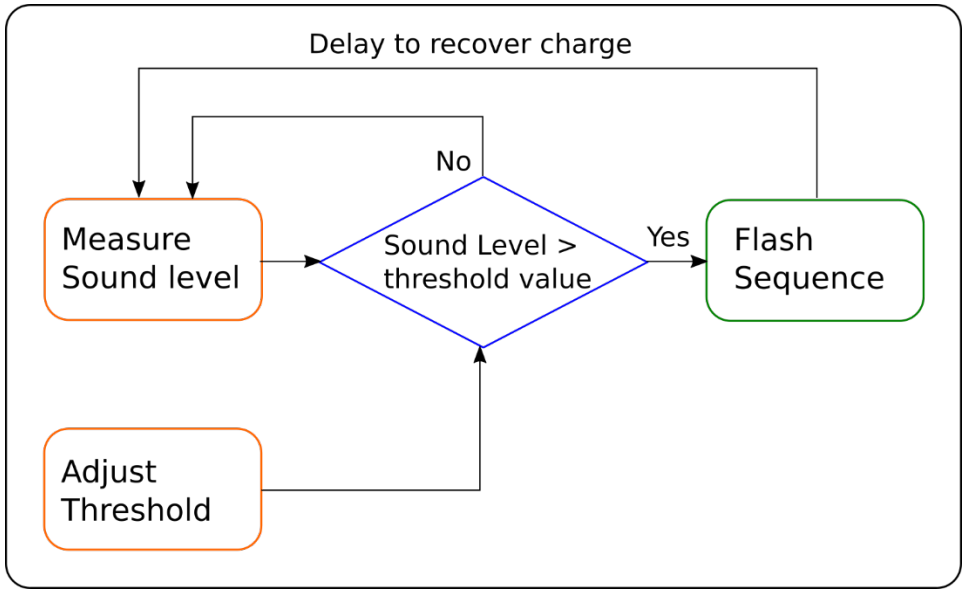
# Flow Diagram for the Electronics




- Flash Sequence is called when the sound level > threshold level
- The flash starts with section 1 fully illuminated.
- The flash spreads through the sections increasing be 25% at each stage until all panels are fully illuminated
- This was done to smooth out the effect

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# Daisy Chain Connection

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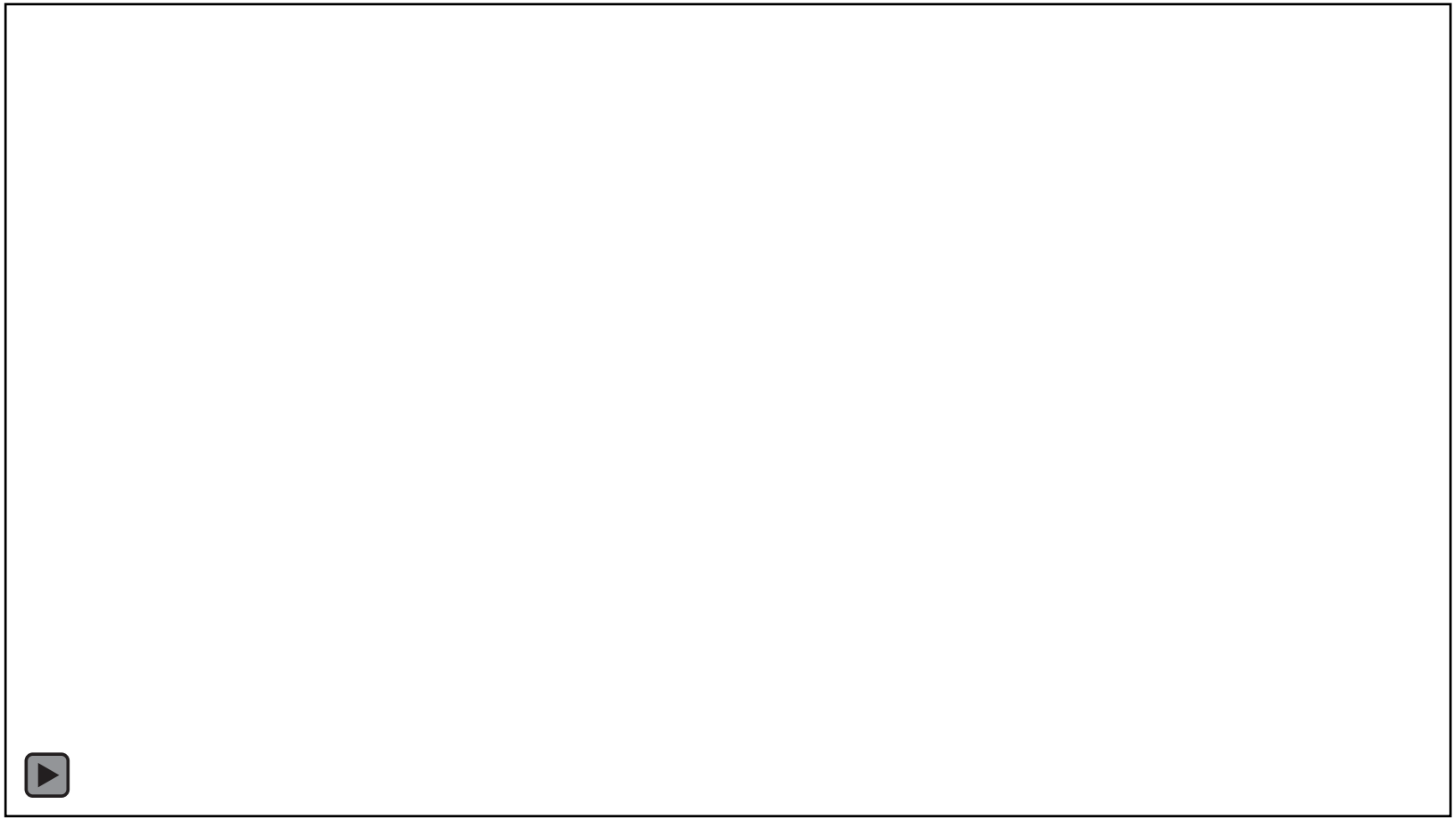
# Daisy Chain Connection



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# The Thunderstorm Dress Assembly

- Leather bodice
- LED Panels
- Decovil interfacing layer

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# The Thunderstorm Dress


- Previously EL
  - Bulky electronics
  - Design
  - Safety
  - Mobility
- Printed LED technology
- Chicago Museum of Science and Industry, Wired to Wear exhibition