

# PiezoPop™ STEM Kit Instruction Manual

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**Welcome to the PiezoPop STEM Energy Scavenger Kit!**



This kit helps you explore the fascinating world of energy scavenging using piezoelectricity. You will generate, store, and release a tiny but powerful burst of energy. Perfect for learning how piezo energy works on a small scale.

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## **What You Get / Features:**

- Piezo tube device (assembled with PCB)
  - 5+ Stainless Steel BBs
  - Discharge Button (top-mounted)
  - LED indicator (top-mounted)
  - Advanced Experimentation Components (Resistors, Capacitors)
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## **How It Works:**

- 1. Shake to Charge**  
BBs move back and forth, striking the piezoelectric element inside. Each impact generates a small amount of voltage.
- 2. Store the Energy**  
The circuit inside captures and stores this energy in a capacitor.

### 3. Release with the Button

Press the button to send all stored energy to the LED. Watch it flash!

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## Instructions:

### Step 1: Load the BBs

Open the device if needed and place 3 or more BBs into the inner tube. More mass = more energy.

### Step 2: Shake!

Shake the device up and down vigorously for about 5-10 seconds. Counting the number of shakes can help keep track of energy generation. It may take 3-5 vigorous shakes before there is enough energy to be seen on the LED, especially if the device hasn't been used in a while.

### Step 3: Press the Button

Push the red button on the top. The LED will light up briefly using the stored energy!

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## Experiment & Learn

- Try fewer BBs. Does it take more shakes to charge up?
- Try more BBs. Does it take less shakes to charge up?
- Try longer shaking. Does it store more energy?
- Advanced Experimentation: Swap the capacitor or resistor and observe the changes.

The more you explore, the more you'll understand how *tiny energy* can still do *meaningful work*!

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## Safety Note:

This kit is low-voltage and safe to experiment with when shaken by hand. There are small pieces in the kit - **USE AGE DISCRETION** and **AVOID CHOKING HAZARDS**.

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## Download Extras:

Visit the [GitHub page](#) for this project to find a wealth of other information including:

- PiezoPop Exploration Worksheet
- PCB Schematic PDF
- Other information updates from community input

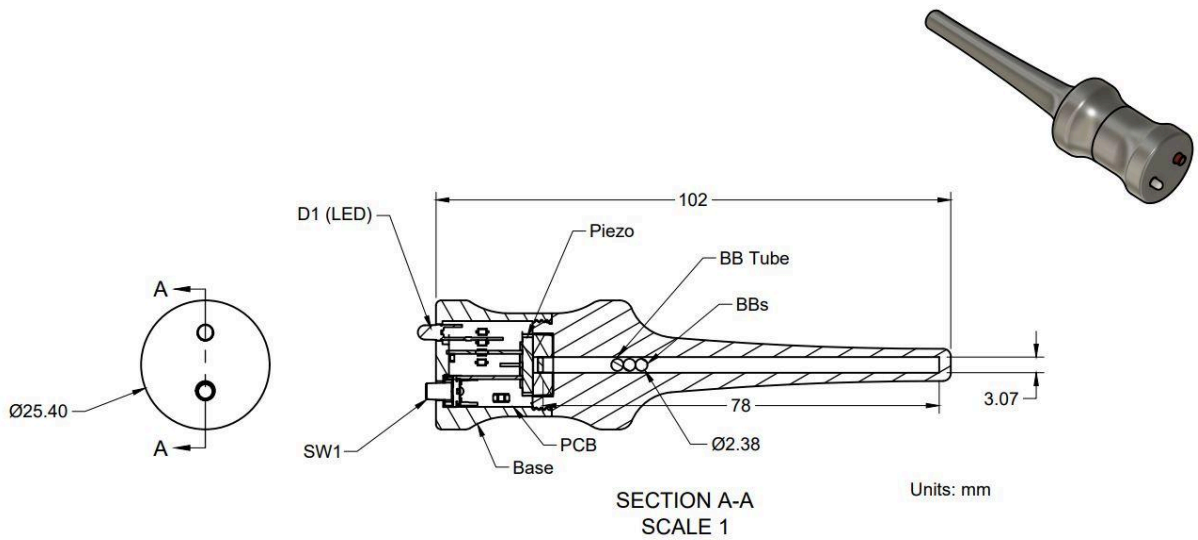
**GitHub:** [github.com/jkocher/piezopop](https://github.com/jkocher/piezopop)

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## Technical Details:

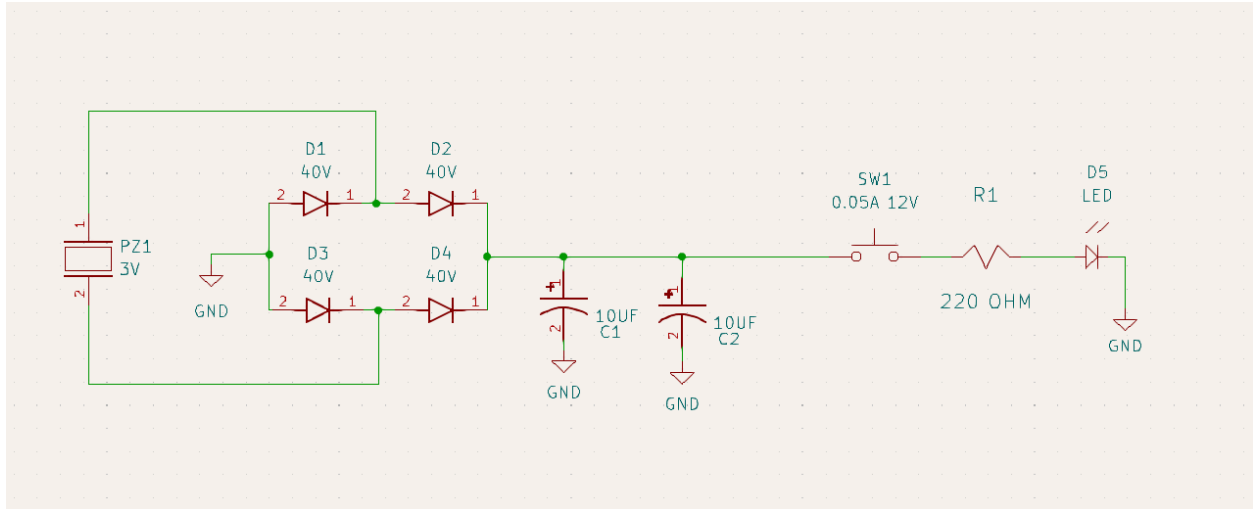
### 2D Drawing

The following 2D drawing shows a cross section of the PiezoPop device so you can understand what's inside and how it works.



### Schematic

The following schematic shows all of the electrical connections in the PiezoPop. Note: C2 is not populated from the factory. It is left open so you can explore additional capacitance (energy storage). Adding capacitance will increase the number of shakes required before you see the LED light up. It's recommended to start with an additional 10uF and work your way up.



## Design Your Future!

Thank you for supporting STEM! The PiezoPop™ circuit design is open source and follows the MIT license. I encourage you to create your own amazing new products and inventions from these fundamental ideas. Use this design as a starting point. Start businesses and change the world with your own creative twist on this fundamental technology!

- Jason Kocher, “i2c\_jason”