

Create Your Own Battery Interrupter!

DIY Toy Adapt Family Fun!



Follow along with
ARISE Adaptive Design's
tutorial video on YouTube:
[@ARISEcny](#)



A battery interrupter is a simple piece of assistive technology (AT) that can allow many battery-operated devices to be connected to an assistive switch for more accessible use. Children's toys are a common piece of electrical equipment that these battery interrupters are used for. A battery interrupter is a quick, simple, and affordable way to adapt an electrical device like a toy that may require a high level of fine motor function and strength to turn on and off to instead be activated with whatever type of accessible switch that works easiest for that specific user. Toys and play should be enjoyed by all children and this simple device helps make that possible!

What is Adaptive Design?

The adaptive design approach was developed as an alternative to the expensive, time-consuming, and frustrating process of obtaining durable medical equipment, as well as for when a specific device does not yet exist to address someone's unique circumstances. By combining creative construction methods with low-cost, basic materials like cardboard, white craft glue, PVC tubing, and Velcro many pieces of adaptive equipment can be replicated or improved upon at a much more affordable price. What is better is that when utilizing adaptive design techniques, the end result can be unique to the user and created to fit their exact dimensions, interests, and abilities.

Adaptive design encourages a collaborative community approach to creating solutions. Typically teams are made up of individuals from different disciplines such as physical and occupational therapy, design and engineering, and most importantly individuals with disabilities (the users) and their families. The adaptive design approach places the device user at the center of their design team.

WHAT IS A BATTERY INTERRUPTER?

A battery interrupter is a simple piece of assistive technology that adds a switch jack to an electrical device. With the addition of a switch jack any number of accessible switches can be connected to allow a user to activate the device. Most battery interrupters, including the one demonstrated in this booklet use a 3.5 mm jack, which can be connected to most any adaptive switch. These are almost always wired to a 3.5mm mono plug.

A battery interrupter can be used with devices that use AA, AAA, C, or D batteries, and that turn on and off with the use of a single switch. Battery interrupters do not work for electrical devices that plug into an electrical outlet or USB port, or that have multiple buttons that activate different features.

The battery interrupter uses two wires that connect to metal surfaces which are separated by an insulator like thick paper or card stock as shown in this tutorial. The metal surfaces are inserted between the electrical device's batteries, or between the battery and battery terminal. This interrupts the electrical signal and redirects it through the switch jack to a connected switch where the signal can be opened or closed by simply touching or activating the adaptive switch.

The most successful and secure way to create a battery interrupter is by soldering the wires of the switch jack to the metal surfaces. However, this tutorial will be demonstrating how to create the battery interrupter without having to solder, which is helpful for those that may not have the equipment or knowledge of how to solder.

Visit Us!

The ARISE Adaptive Design workshop
ARISE Independent Living Center
635 James Street
Syracuse, NY 13203

Website

ARISEinc.org/arise-adaptive-design

Follow Us on Social Media

Facebook: [@ARISEAdaptiveDesign](https://www.facebook.com/ARISEAdaptiveDesign)

Instagram: [@ARISE_Adaptive_Design](https://www.instagram.com/ARISE_Adaptive_Design)

Twitter: [@ARISEcny](https://twitter.com/ARISEcny)

“ Practice of real-life tasks and activities (playing with toys!) is not only fun, but also critical to brain development. Adaptations that allow children with mobility challenges to activate a toy help these children to develop cause and effect understanding. Switch activation of lights or fans (“environmental controls”) gives them control over their sensory environment. This is an important experience for young children!

Effective early learning requires a child's spontaneous attention and genuine motivation. At the brain level this sort of active engagement literally causes the brain to grow. Experts in early brain development call this “experience-dependent neuronal plasticity”.

— Nienke P. Dosa, MD, MPH



How to Build a Battery Interrupter

Step 1

Count all of the parts in your kit, collect all the tools you will need, and set up a workstation where you will have plenty room to build comfortably.

Materials and Tools

- 3.5 mm mono cable jack
- adhesive backed copper foil
- business card or poster board
- electrical tape
- pencil or pen
- scissors

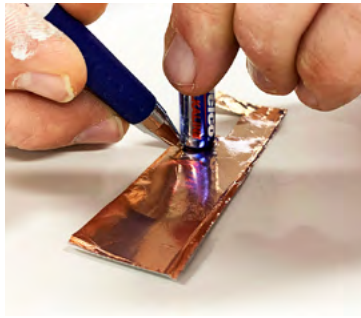
Helpful, Not Required:

- solder
- soldering gun
- tweezers
- shrink-wrap



Step 2

Cut a 1-inch strip of the adhesive backed copper foil from the roll. Flatten this segment out and trace the outside profile of the battery from the device you will be using the battery interrupter for. Trace the battery profile in two places on this strip of copper foil.



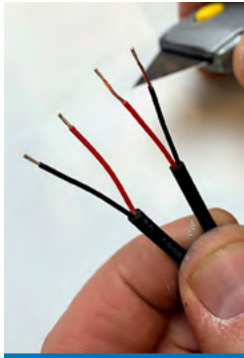
Step 3

Cut out the two traced battery outlines from copper foil.



Step 4

Place the battery on the business card or poster board about 1/2-inch from one edge and trace the battery outline on the card twice as shown. Make the circles about 1 mm larger than the battery profile so they are a little larger than the circular copper cut-outs. Finally, draw a tail off the circle and extend it to the edge of your business card.



Step 5

Cut about 1/4-inch of insulation back from the end of the two cords coming from the mono jack. To do this, use a pair of scissors or utility knife and put light pressure on the cord where you'd like to expose wire to and go around in a circular motion. Then using the edge of the utility knife blade or scissors tug the unwanted portion of insulation towards the tip of the wires until it slips off.

Note: skip this step if you plan to solder the wires to the copper.

Step 5.5 If you are comfortable using shrink-wrap to later secure the wires, you will want to slide the shrink-wrap over both wires. This can be left alone for now as it will be secured in place after a few upcoming steps.

Step 6

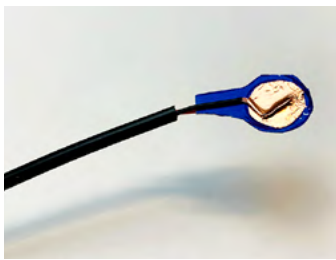
Place the wires in the center of the circular drawing on the business card and slightly bend the exposed end of the wire in a zig-zag manner as shown in the picture.

Repeat for the second wire.



Step 7

Cut the business card drawing out. (Only one is needed)



Step 8

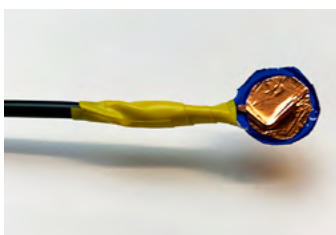
Place the exposed wire onto each side of the business card cutout and press copper circular cutouts over the top of each wire to hold them in place. Make sure to thoroughly press down copper foil around all the edges of the bent wire and outer edges of the foil.

Note: if you are comfortable soldering the wires to the copper foil, do not place the wires on the underside of the adhesive copper foil cutouts. You will need to place them on top to properly solder them. Soldering the wires to the copper foil can be done at this time.



Step 9

Carefully bend the sides of the business card tail around the insulated wires. Holding the wires so one is on top of the business card tail and the other is below it, wrap one side of card tail around the upper wire, then wrap the opposite side around the wire underneath.



Step 10

Using electrical tape, tightly wrap around the tail of the business card to better anchor the two wires to the exposed card tail or...

If you choose to use shrink-wrap you can position shrink-wrap and use a heat source such as a heat-gun or hair dryer to shrink the material around the wires, securing them in place.

Step 11

Place your new battery interrupter in-between either the battery and battery terminal, or between two connecting batteries. In order to make room for the wires to exit outside of the battery compartment a hole or segment of the plastic may need to be cut or drilled away. Using an electrical drill, or Dremel cutter is a safe way to create this opening.



Step 12

Once you have successfully reattached the cover on the battery compartment, you can connect any adaptive switch that has a 3.5 mm plug to your new battery interrupter jack. Make sure your electrical device is turned on and you are good to go!



Where to Find Premade Battery Interrupters

If you would rather just buy your battery interrupters in the future they can be purchased from multiple locations from anywhere between \$12-\$25. Here are some of the resale sites online that offer battery interrupters of different sizes:

Ablenet

<https://www.Ablenetinc.com>

Adaptive Tech Solutions

<https://www.adaptivetechsolutions.com>

Amazon

<https://www.amazon.com>

The organization *Makers Making Change* has developed this handy battery interrupter that can be cut to any battery size. Unfortunately, this item is not yet for sale, but we hope it will be in the near future.



Solutions for Adapting More Advanced Toys and Electronics

For toys and equipment that have more than just a simple on-off function, more advanced methods need to be employed to allow the device to be switch activated. Sometimes this means opening up the piece of equipment and hardwiring the mono/ audio jack cables to the electronics inside using solder and a soldering gun. Fortunately, there are some great programs and resources available to assist in adapting toys to be more accessible.

FairPlay

<https://www.fairplaylibraries.org>

Switched Adapted Toys

<https://www.switchedtoys.org>

Jericho Adapts Toys

<https://www.jerichoadaptstoys.org>

Makers Making Change

<https://www.makersmakingchange.com>

Instructables

<https://www.instructables.com>

The Family Fun series is a collaborative project of Golisano Center for Special Needs, Arise Adaptive Design, and David's Refuge.

More info: <http://FitnessInclusionNetwork.org>

This guide was developed in 2021 by Connor McGough and Tracy Fleming at ARISE Adaptive Design in Syracuse, NY, and Nienke P. Dosa, MD, MPH, Upstate Foundation Professor of Pediatrics Golisano Center for Special Needs, SUNY Upstate Medical University, Syracuse, NY.



UPSTATE
FOUNDATION



Golisano
Center for Special Needs

Collaborative partners in local initiatives that focus on ability and wellness for children with disabilities.