# Homopolar Motor Workshop

This is National Electronics Museum Educator Sam! She will show you how to make a homopolar motor. You can see the motor in action at https://youtu.be/eb3Ku3WR6EU .

This workshop is best for people aged eight and older; an adult should supervise anyone under 18 when building and operating the motor.

The homopolar motor was the first electric motor. Michael Faraday designed it in 1821. This motor uses direct current. The copper wire is a conductor of electricity. The electricity flows from the battery, through the copper wire and into the magnet. The magnet sends an electrical charge to the other side of the wire and back up to the battery, making a complete circuit. When the current passes through the wire it creates a magnetic field around the wire. The magnetic field around the wire is repelled by the magnetic field around the magnets causing the wire to spin. This is called the Lorenz Effect. This electric motor converts electrical and magnetic energy into mechanical energy. Larger electric motors are used in things like toys and even electric cars!
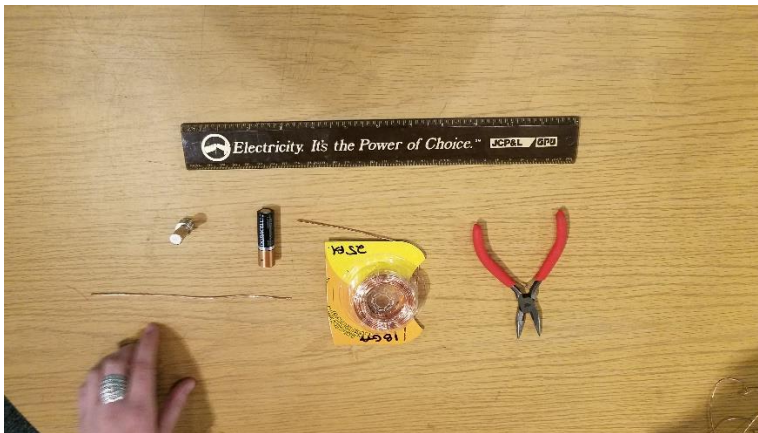
Materials Needed:
7-inch piece of 18-gauge copper wire
AA battery
Neodymium (aka rare earth) magnets
Needle nose plyers & Wire Cutters
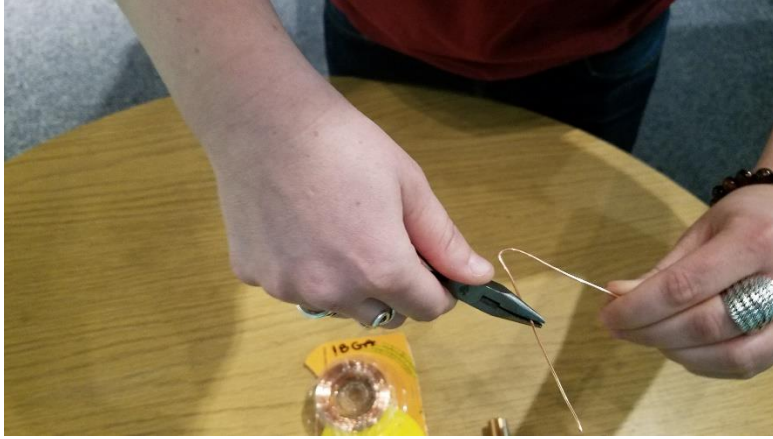
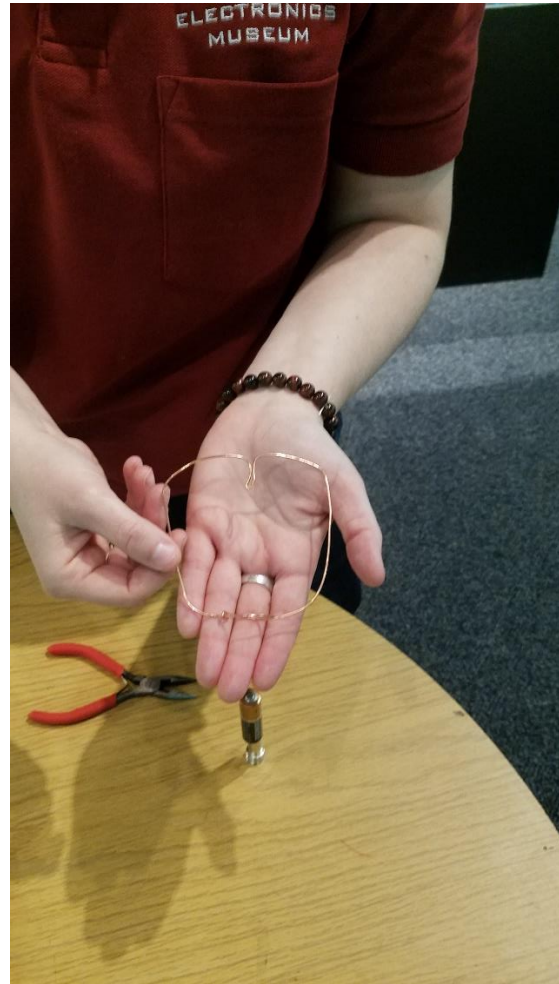1. Use your pliers to bend the wire in the middle.

2. Continue bending the wire into a small loop.

3. Bend the wire down on each side of the loop you made.

4. Attach the magnets to the negative end of the battery.

5. Bend each of the ends of the copper wire in towards the center.

6. Place your bent wire around the battery. The loop should rest on the top (positive end) of the battery and the ends of the wire should be lightly touching the sides of the magnets.

Once the wire is touching both ends of the battery, it begins to spin.

Customize! Instead of a plain loop, you can make a simple square from the wire, a heart-shaped design, or even a tiny dancer. There are lots of options! It takes some adjustments (and patience!) to ensure the wire spins, but it's all great fun!