

Unipolar (DC Electric) Motor

The unipolar motor is the simplest motor to build. These motors are easily constructed with materials lying around the house. Originally invented by Michael Faraday in 1821, these motors are amazing and simple to build.

The supply kit includes: 4 neodymium magnets, 1 alkaline battery, bare copper wire, insulated copper wire, and 2 safety pins. The only tool you should need is a pair of needle nose pliers to bend the wires.

Warning: This is not a toy and should not be given to young children. While these motors are reasonably safe, the chance of pinching fingers between magnets is fairly high, if you are not careful, and moderately high, if you are careful. Do not attempt to build with rechargeable batteries or any batteries other than alkaline. The chance of overheating lithium, NI-cad or any other battery is quite high. Keep the magnets three feet away from computers, iPods, mp3 players, cellphones, and any other electronic device. These magnets are strong enough to ruin your devices.

The Runner

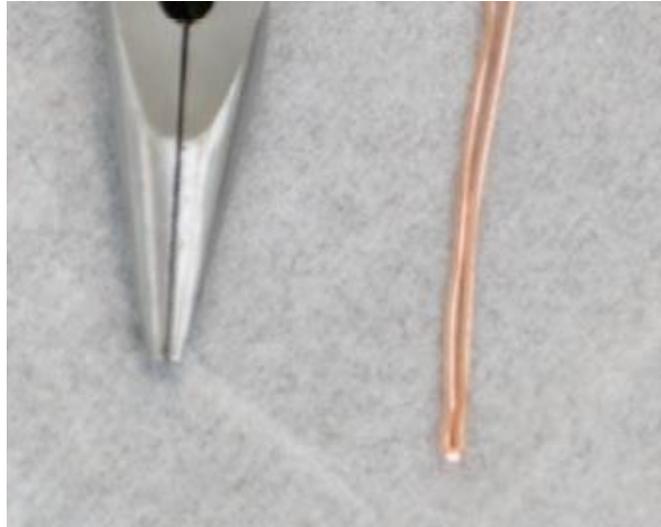
First, take a piece of insulated wire and bend it in a “U” shape. Strip the insulation about $\frac{3}{4}$ ". Place two magnets on each end of the battery. To help the wire stay, form the wire around the magnets. This should make the battery roll; to reverse the direction, flip the battery over.



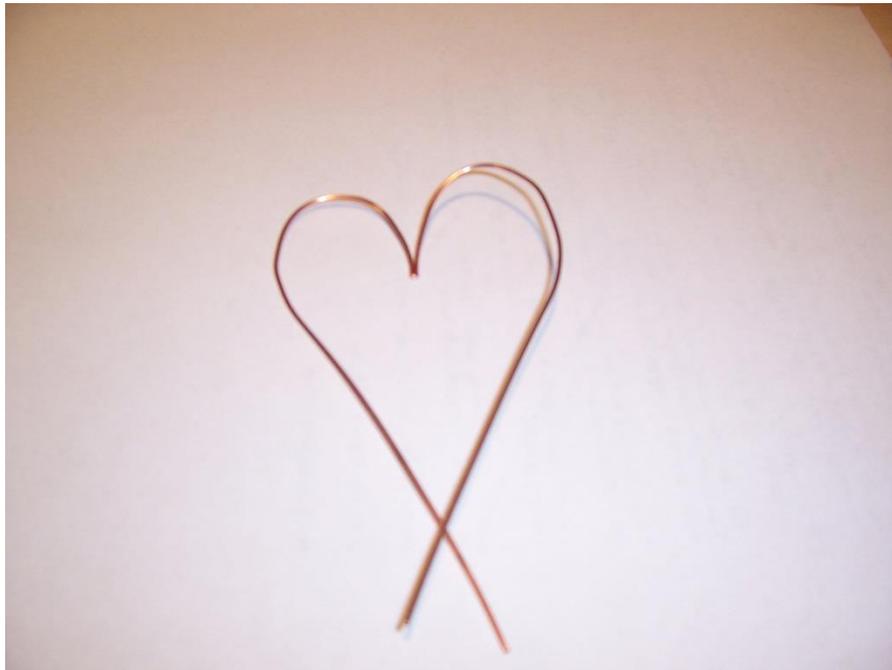
My Heart Spins for You

There are a variety of designs for this motor project. Use these instructions as the guidelines and then build your own design.

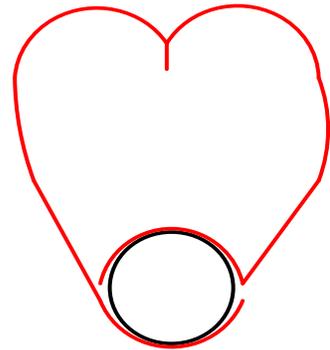
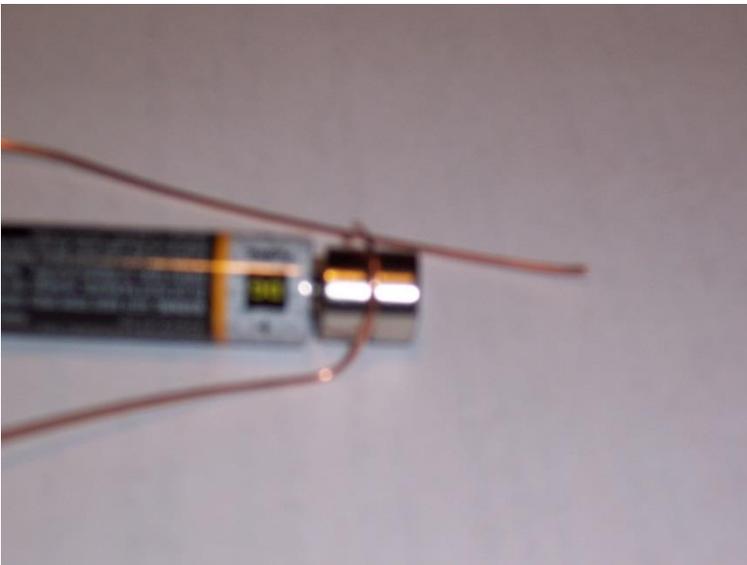
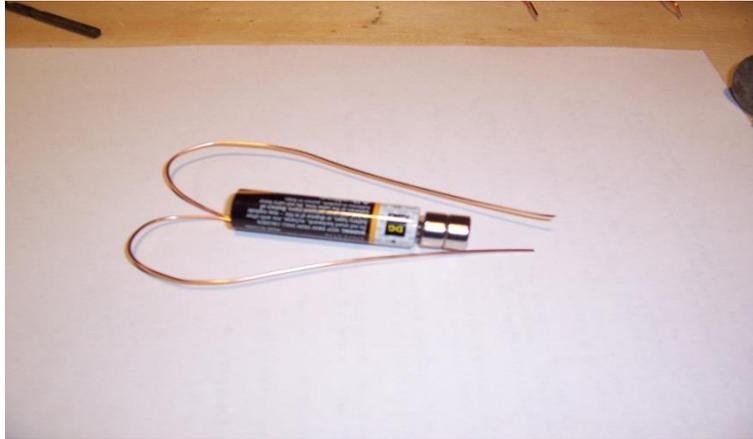
Cut approximately 1 foot of uninsulated (bare) copper wire with your needle pliers. At the center point, bend and crimp with the pliers.



Now bend the wire into a heart shape.



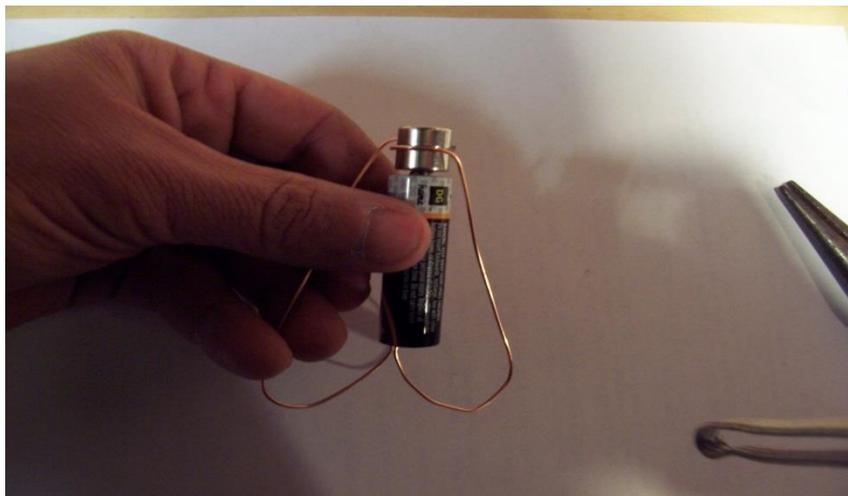
Place the positive (+) side of the battery on top of two magnets. This is your guide to bend both sides of the ends of the heart around the magnets.

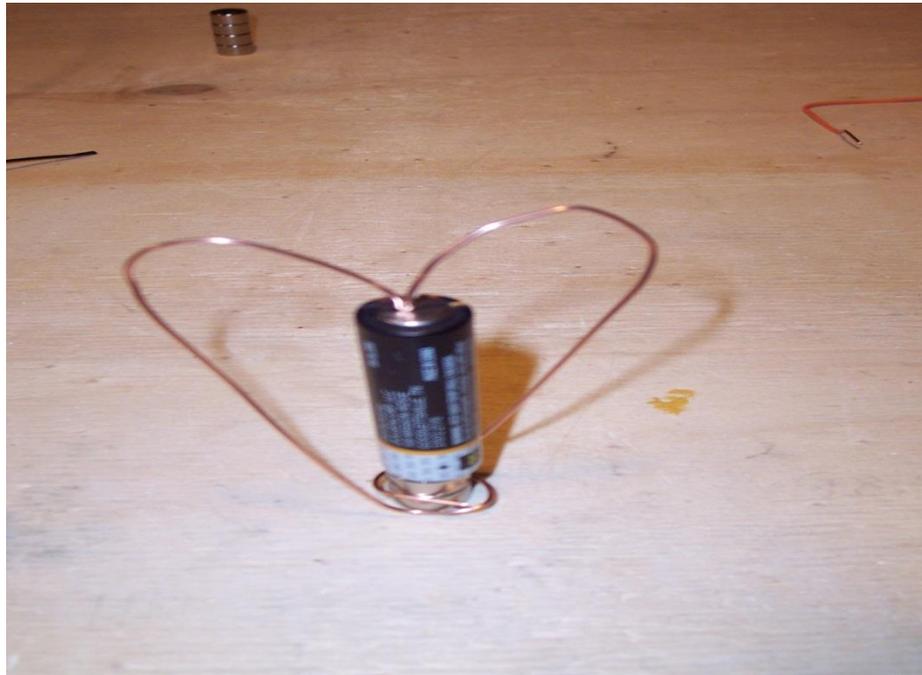


The other end of the conductor should be wrapped around the opposite side of the magnets.



The wire should wrap around the magnet, the two ends should not touch. You do not want this to be too tight or the heart will fail to spin.





Now place in the upright position; you may need some adjustment to the wires to make it spin properly.

Watch the “My Heart Spins for You” video clip at www.alfredstate.edu/hs-challenge-projects.

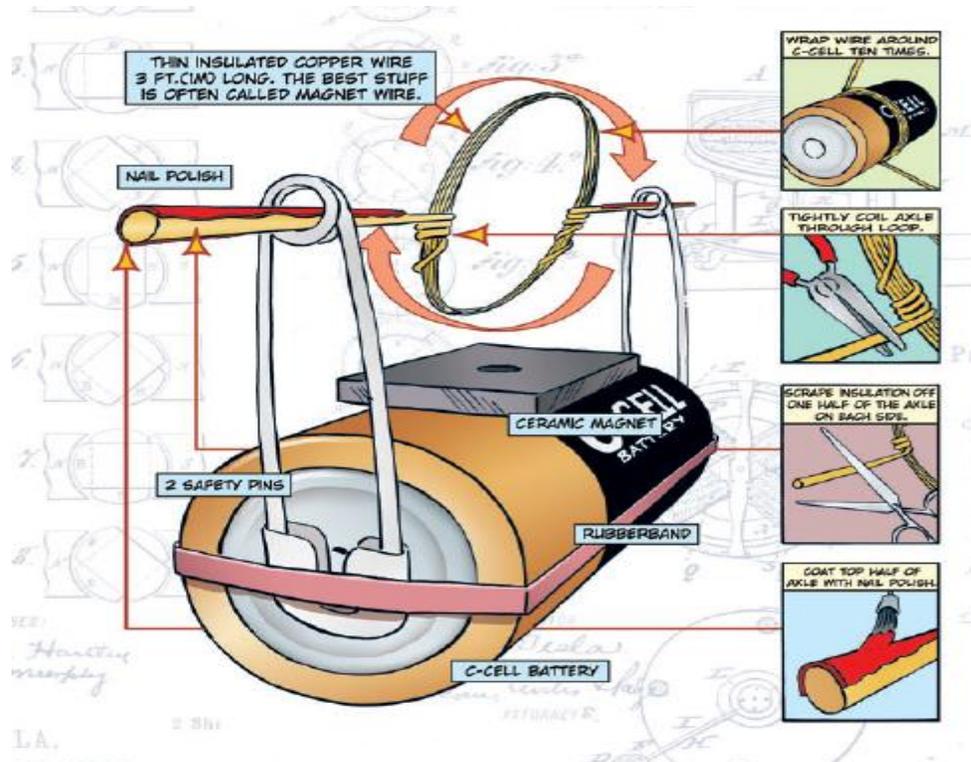
If you switch the battery around, this Unipolar motor will spin in the opposite direction. This project has many different variables. Find them at:

<http://www.youtube.com/watch?v=5a89OwBdyUk>

This has many different designs, but they all have the same concept.

The Simplest Motor

I found this one on an internet site and thought it was right up our alley. This simple motor is more of a traditional DC motor. I made this one in 10 minutes and I found ways to improve on this simple design.

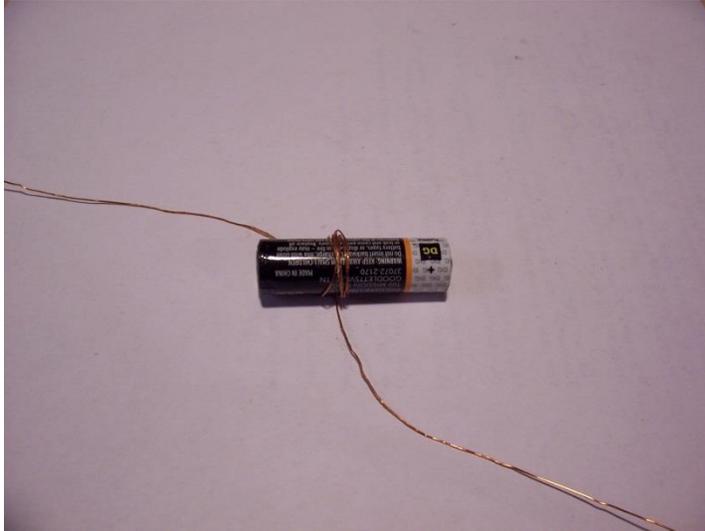


The parts list I made for mine is a little different.

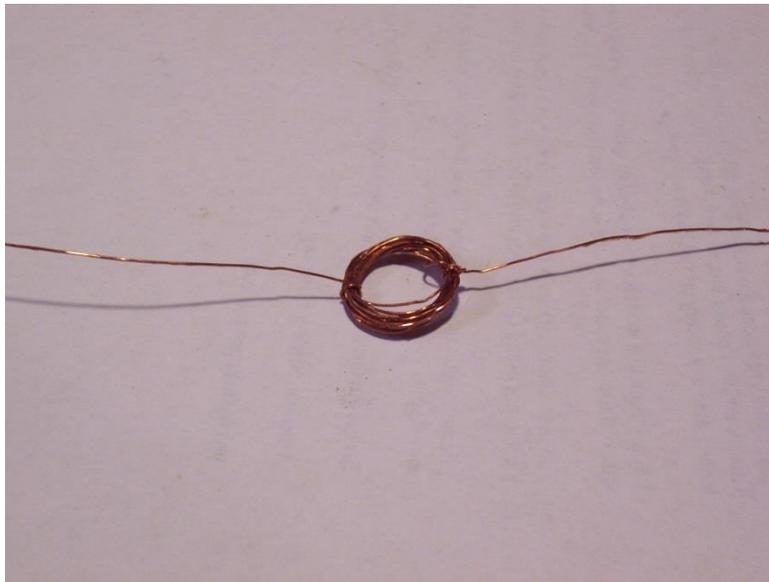
1. C cell alkaline battery
2. 1 magnet - the ones we used earlier work good
3. 3 feet of copper magnetic wire
4. 2 paper clips
5. Black electrical tape

Watch the “The Simplest Motor” video clip on the web at www.alfredstate.edu/hs-challenge-projects.

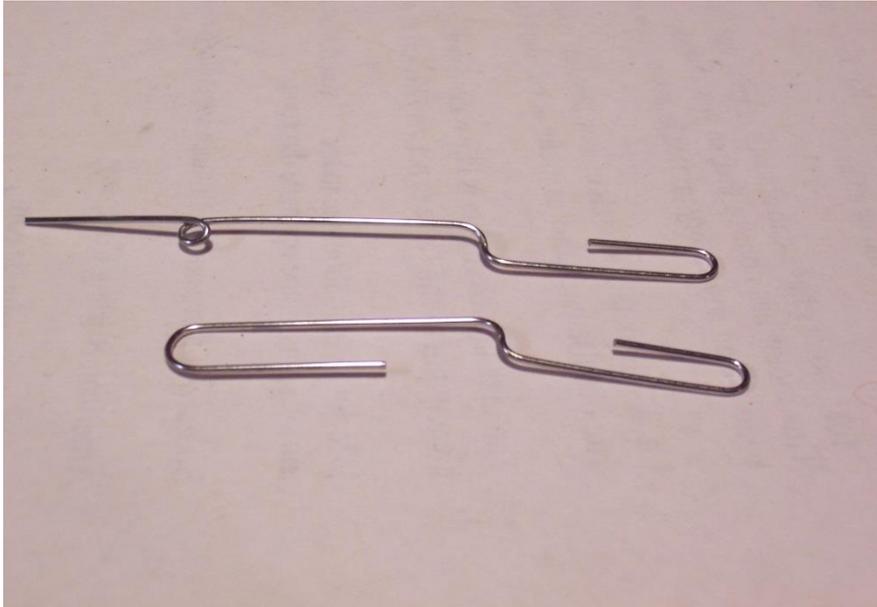
Step one is to take the magnetic wire and make a coil around the AA battery.



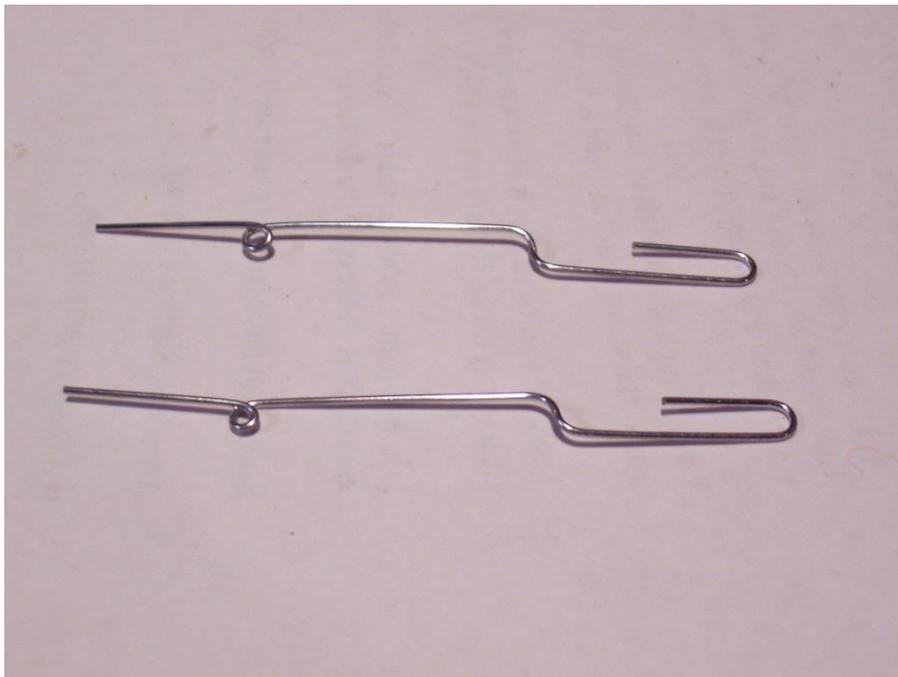
Step two is to tie a knot in the armature.



Step three is to bend the paper clips. Then make a loop in the clip.



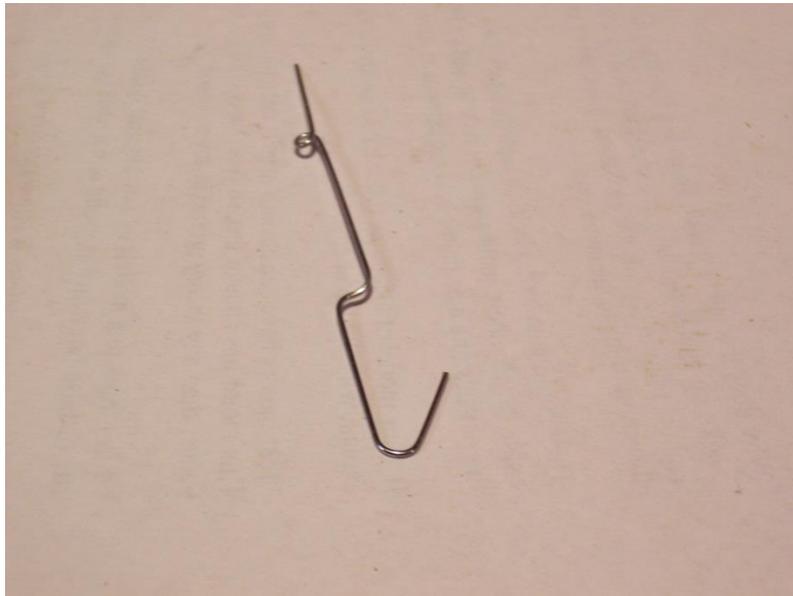
Do this to both clips.



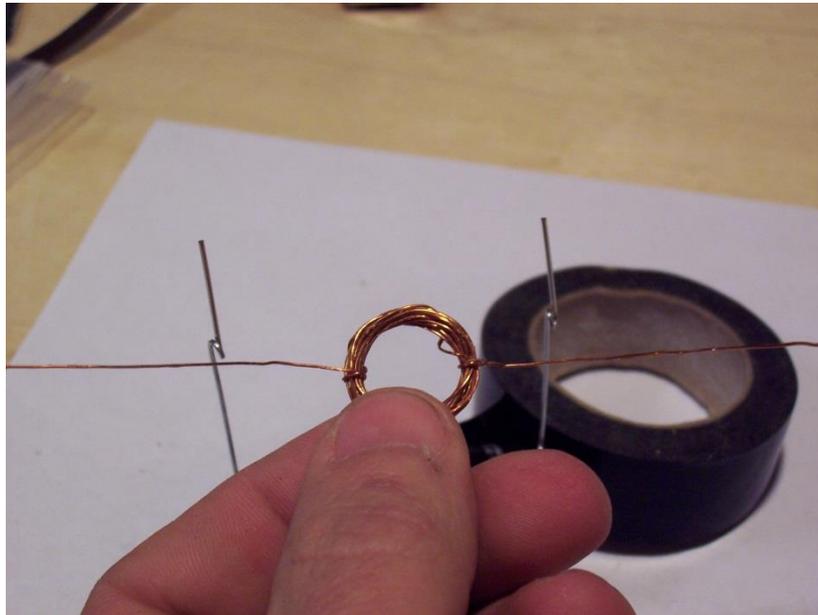
Mount the clips to the battery, using the electrical tape to the (-) Negative side of the battery.



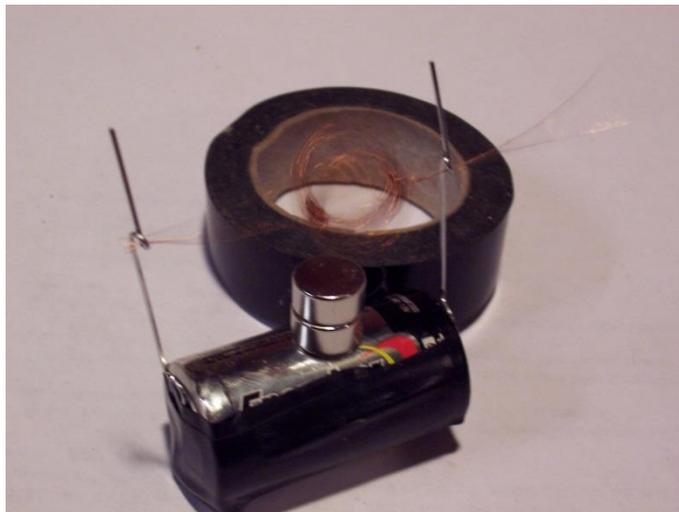
Make the clip wider to fit around the (+) positive post of the battery.



Place the clip around the post and continue to tape. I like to go around the battery twice. The next step is to line up and cut the armature. I like to have an inch on each side.



Because there is insulation on this wire in the form of shellac you need to sand this off. Use a piece of sand paper to achieve this. Next, place the two magnets on the top of the battery and carefully install the armature by siding one end, then the other. You want the coil to be centered over the magnets. Make sure your armature is straight and it should start to rotate.



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