Blinkybug Kit Instructions v2.0

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What is this thing?

Blinkybugs are simple little electro-mechanical insects that respond to movement, wind, and vibrations by blinking their LED (light-emitting diode) eyes. Despite their simplicity, they have a strangely lifelike quality.

Kit Contents

Your kit includes the parts required to make 4 Blinkybugs, and consists of:

- 8 LEDs (2 each of red, green, yellow, and blue)
- 1 52" length of music wire
- 4 coin-cell batteries
- 4 12" pipe cleaners, assorted colors
- 4 1.5" copper tubes
- 1 roll of "glue dots" (containing 8 dots)
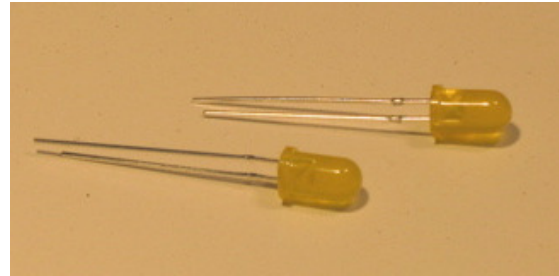- 1 3" x 2" piece of adhesive aluminum foil

Required Tools

Before getting started, you should have the following tools on hand:

- Scissors
- Needle-nose pliers
- Wire cutters
- Cellophane tape (e.g. *Scotch* tape)
- Permanent marker (e.g., a *Sharpie*)
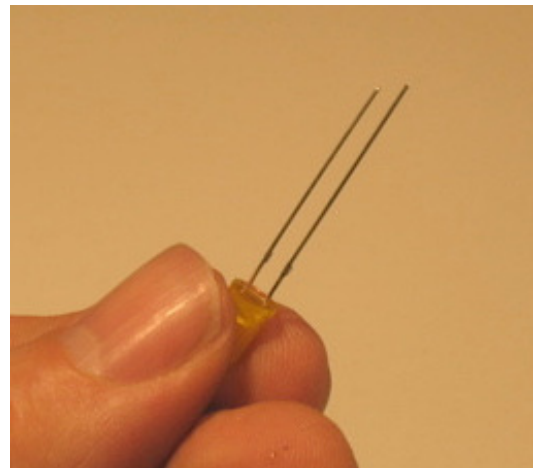- Ruler, yardstick or measuring tape

Building your bug
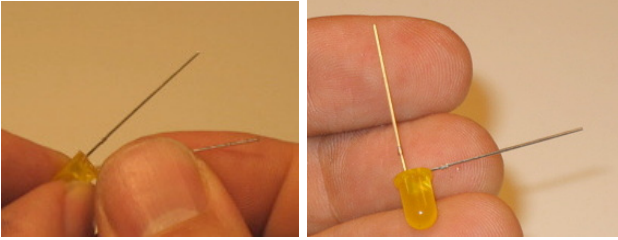
1. Preparing the LED "eyes"

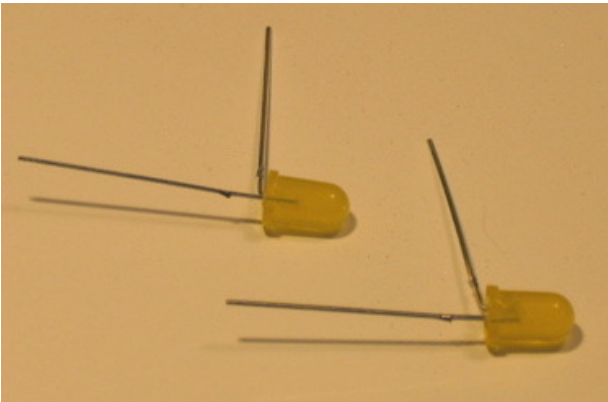Grab 2 LEDs of the same color (or different colors, if you like):

Notice that each LED has 2 wire leads, and that one lead is slightly longer than the other. The long lead is the "positive" lead… this is important, as LEDs need to be oriented the right way, or they don't work!
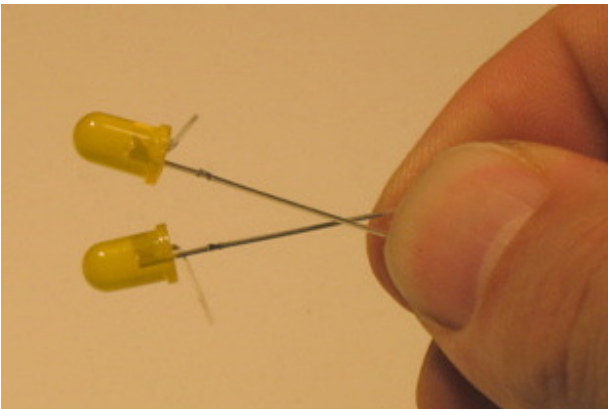
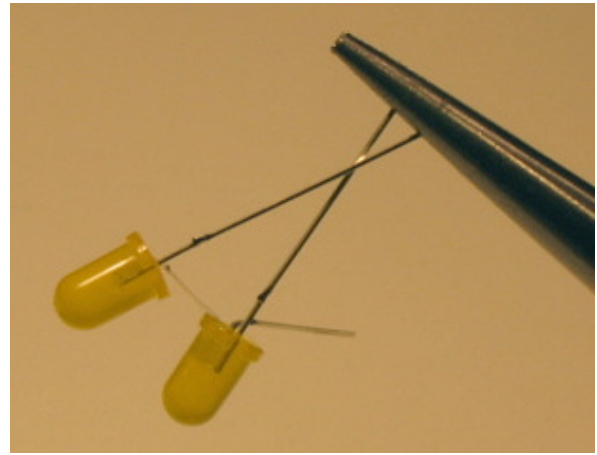Now grab the longer, positive lead, and bend it to a 90º angle:

Do the same for the positive lead on the other LED. They should look like this:
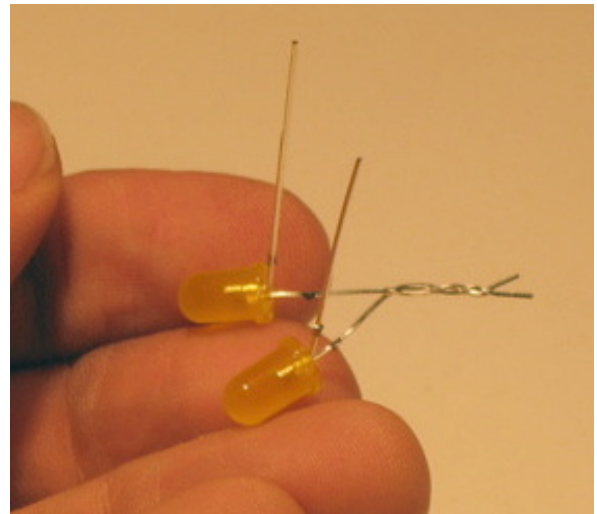
Next, you want to twist the 2 shorter (negative) leads of the LEDs together. First, with the LEDs pointing in the same direction, and the positive leads parallel to each other, cross the ends of the two negative leads, like so:
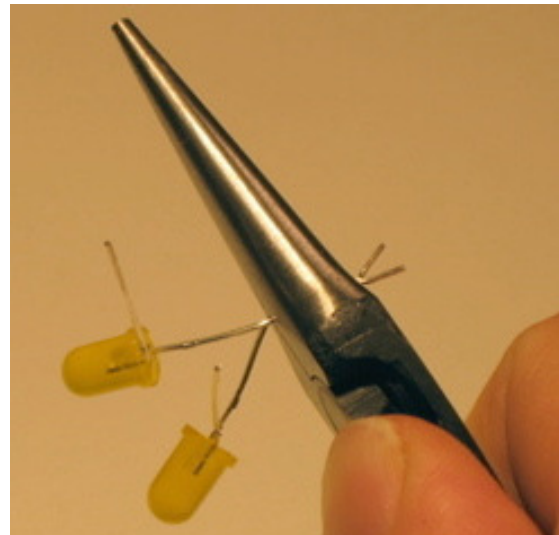
You may find it helpful to use your pliers for this part, as seen here:
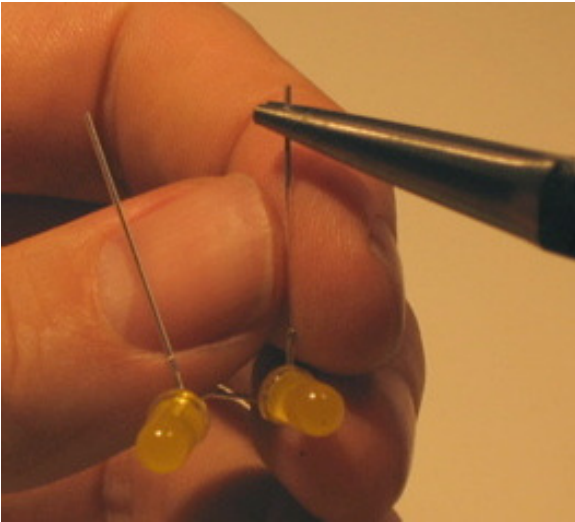
Now, using the pliers or your fingers, give the leads about 3 or 4 twists. The result should look something like this:

You may notice a bit of "jiggle." This is easily remedied by giving the twisted leads a good squeeze with the pliers, like so:
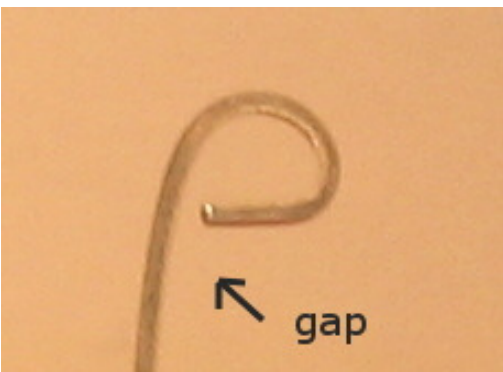
Next you will add little loops to the ends of the positive leads. With the pliers, grab the end of one of the positive leads:
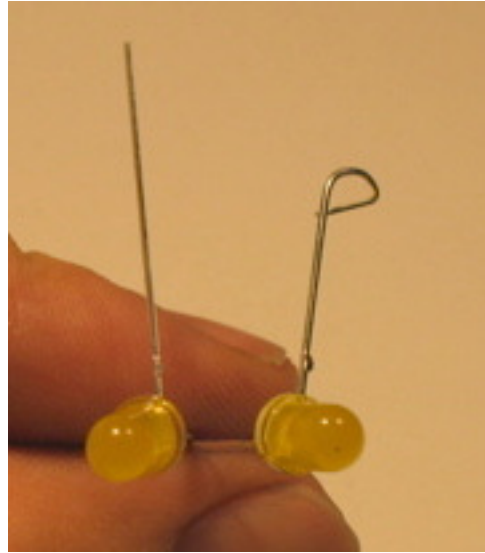
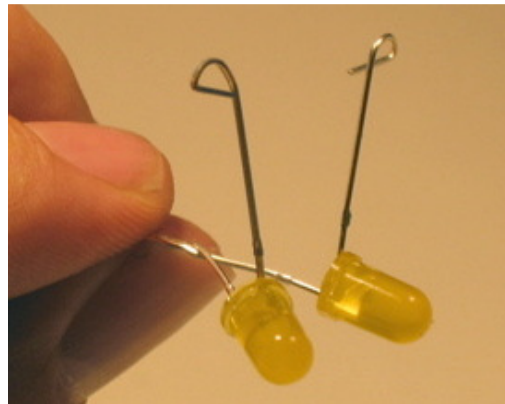Now give it a twist in the *outward* direction, making a small loop:

Don't close the loop completely; leave a small gap:

gap

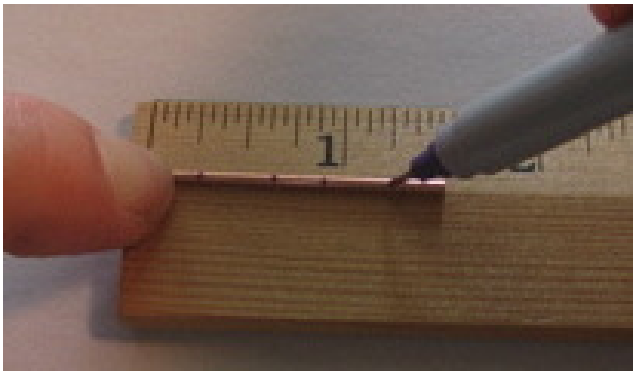It should look something like this:

Now create a loop on the other lead in the same manner, twisting it in the opposite direction. Here are what the completed "eyes" should look like:
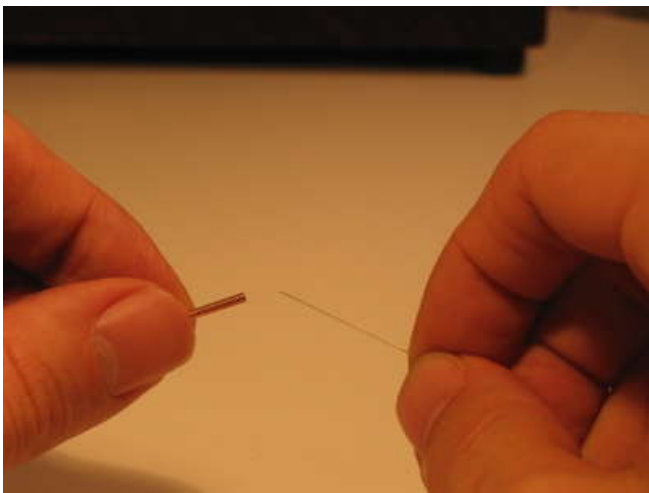
2. Preparing the Antennae

Grab one of those little copper tubes, your ruler, and a permanent marker. Mark the tube at the following measurements:
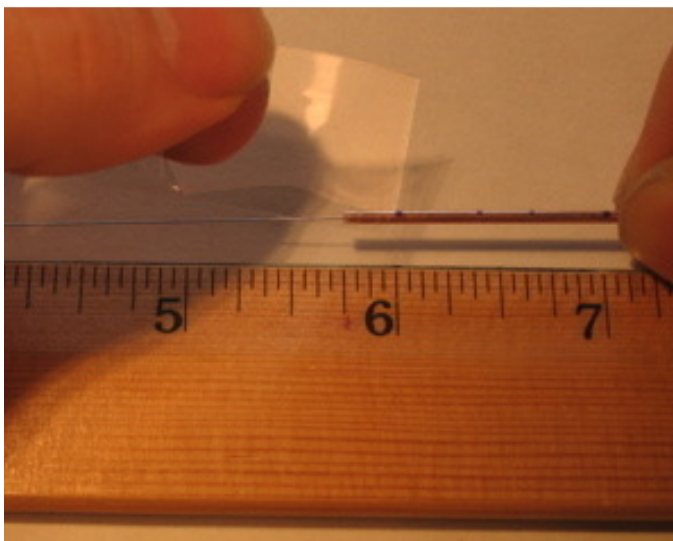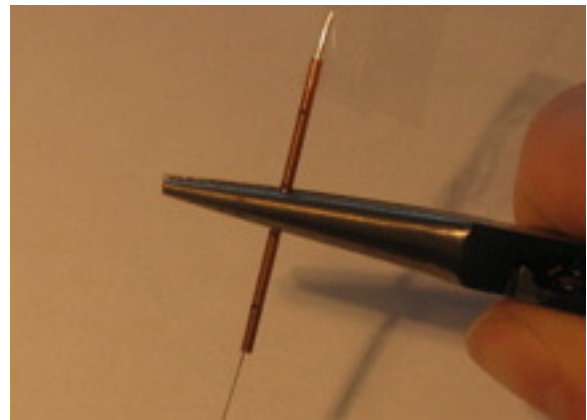
- 1/4"
- 5/8"
- 7/8"
- 1 1/4"

Grab the spool of music wire (the flexible thin wire), and cut a 13" length using your wire cutters. Now insert the music wire into the copper tube:
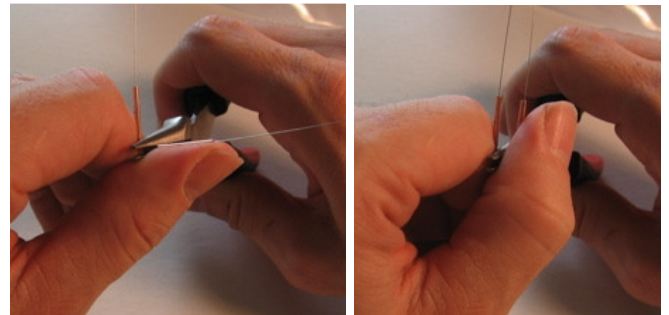
Slide the tube about ½ of the way down the length of the wire. Use the ruler to help center it; there should be 5 ¾" of wire extending from either end of the tube. You use a little piece of tape to help keep the wire in place, like so:
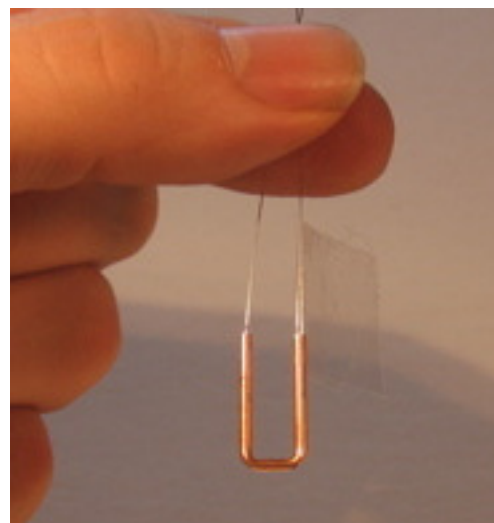
Now, with your needle-nose pliers, grab the copper tube right between the two center-most marks (those at 5/8" and 7/8"); you should have equal amounts of copper tube and wire extending from either side of the pliers:
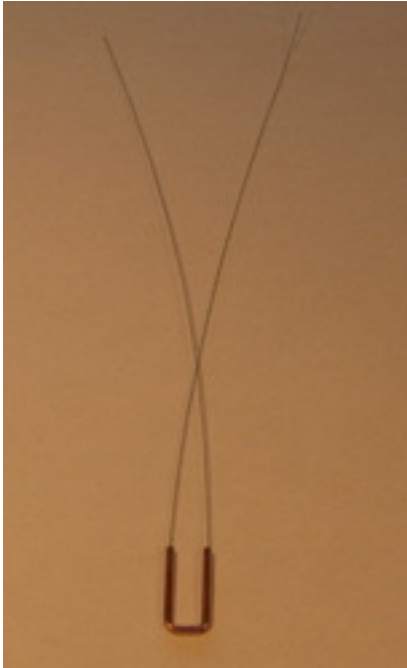
Next, using your thumb while firmly holding the copper tube in place with the pliers, bend each end of the copper tube 90°:

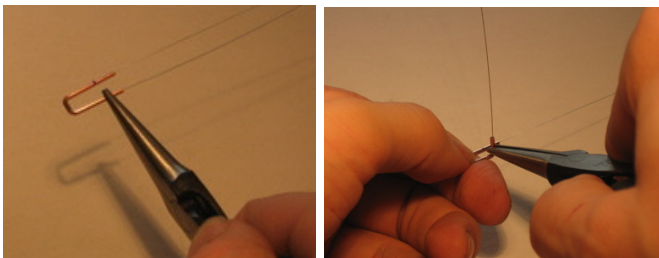They should be bent in the same direction, so that they are parallel. It should look like this:

If one section of copper tube is slightly longer than the other, don't worry about it… this is not an exact science! You can now remove the bit of tape. Here is another view of what we have so far (don't worry if the wires cross like this or not):

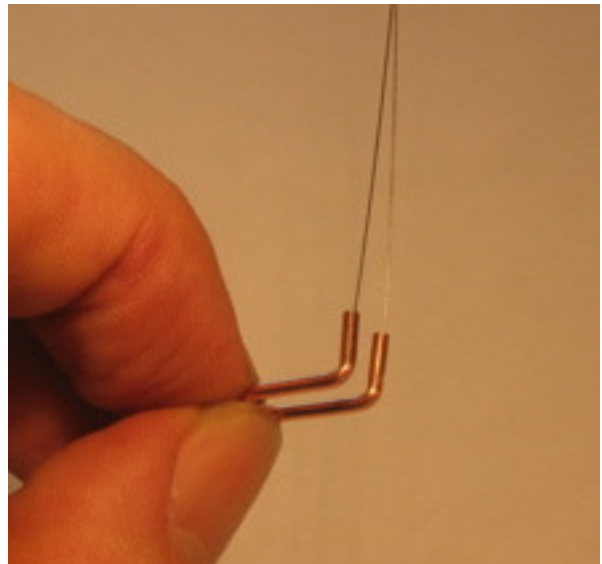You should have something that looks like this:

If one "antenna" is slightly longer than the other, use the wire cutters to even them out.

Next, bend each tube 90° at the remaining marks, grabbing the end of the tube with the pliers like so:

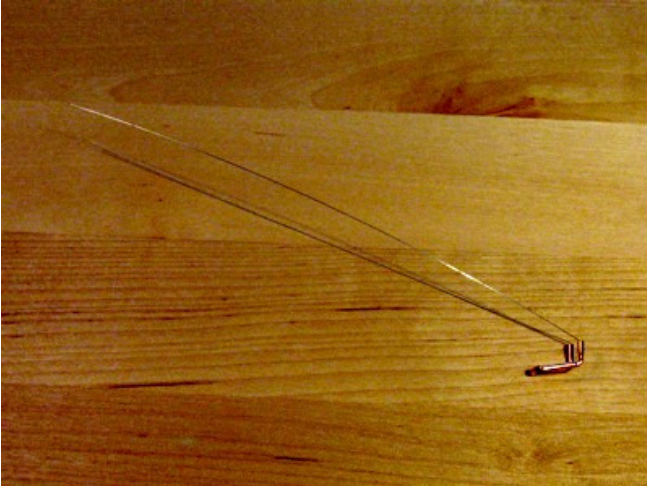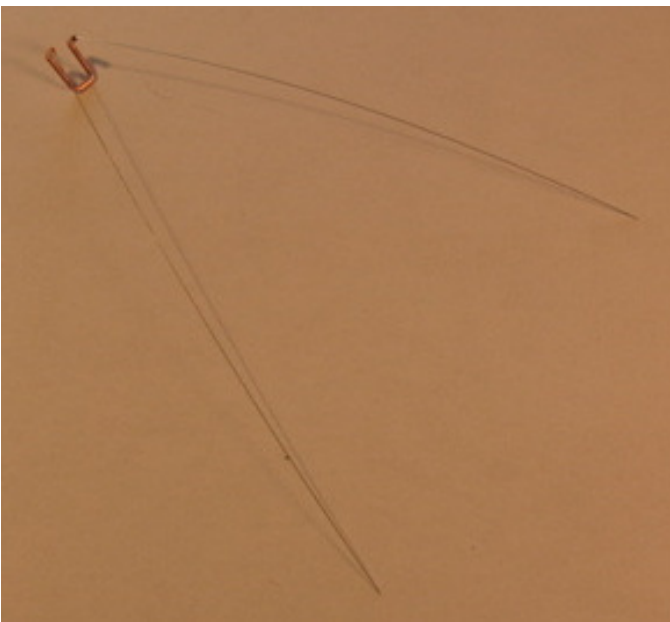Next you need to bend the music wire where it exits the tube so that it sweeps forward—that is, in the same direction as the bent copper tube. Because this wire is "springy," you need to really mash it a bit with your finger. Push down firmly on the wire as shown here:
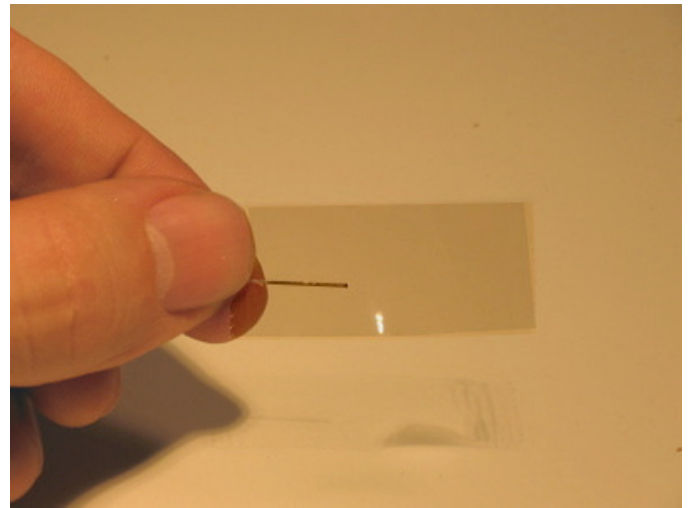

5

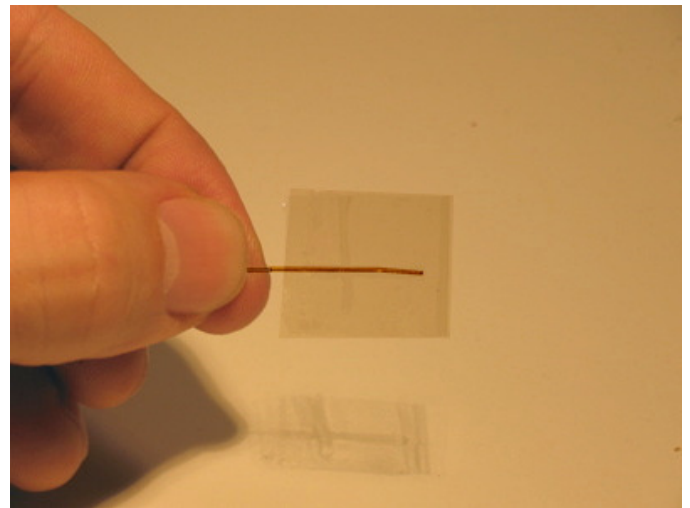After you do that for each section of wire, it should look like this:

As in the photo above, the wire should be at slightly less than a 45° angle to the "base" of the copper tube, and the antennae should spread out "sideways," creating a roughly 45° angle between them (see below). Again, this doesn't have to be exact at this point… you can fine-tune it later.
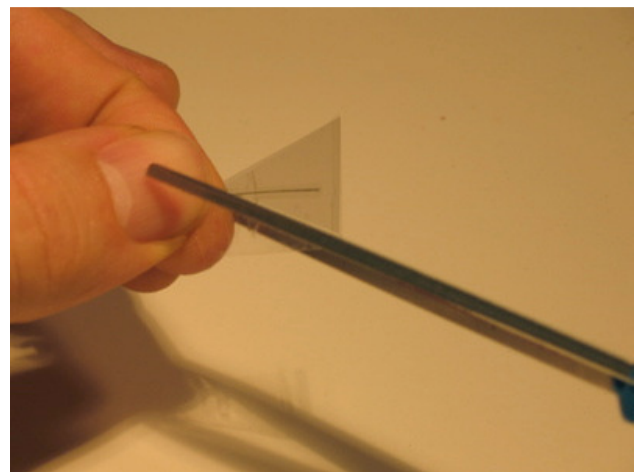

Next, you want to add little flaps to the ends of the antennae; this will make it far more sensitive to light breezes. Tear off a 1 ½" strip of cellophane tape, and stick it on the end of one of the antennae so that the end of the wire extends about half-way down the length of the tape:
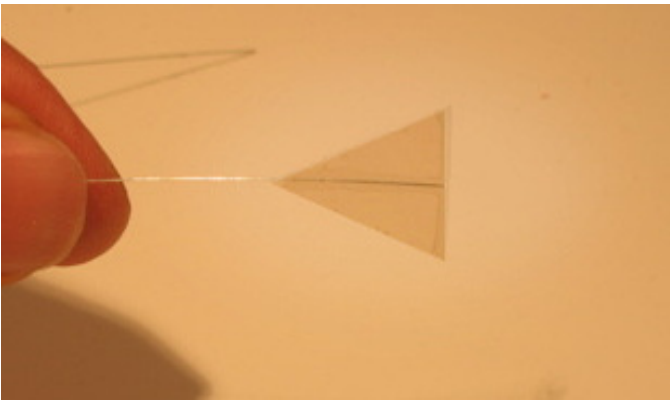

Now fold the bit of tape that extends past the wire back over the wire so that the tape sticks to itself. You should now have a little square-ish tab of tape on the end of the wire, without too much (or any) of the sticky side exposed:

Finally, trim the tab down to a triangle shape with a pair of scissors:

6

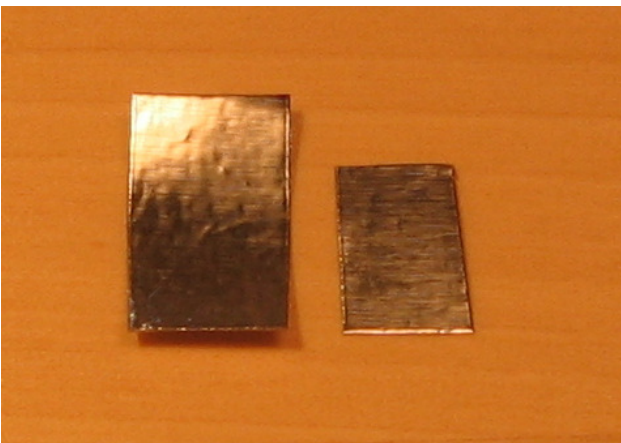You should have something that looks like this:

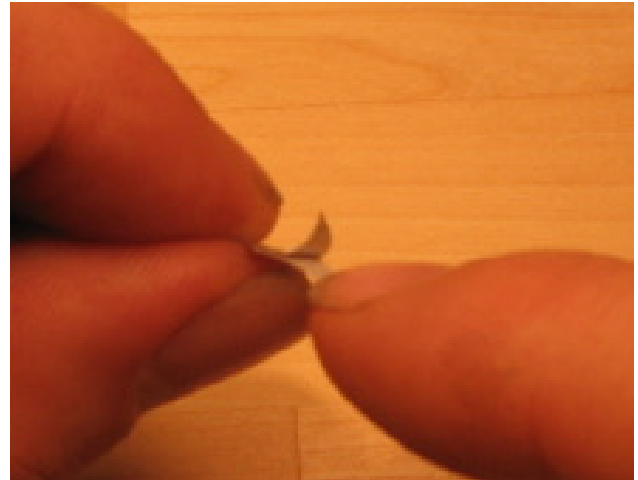Do the same for the other antenna.

3. Assemble Antennae, Eyes, and Body

Grab a battery—one of the coin-shaped things. Notice that one side has writing on it—in particular, notice the "+" sign. This is the *positive* side of the battery, and the flip-side, with no writing, is the *negative* side… this will be important later!

Now grab the 2" x 3" piece of foil. Cut 2 pieces: 1 piece should be about ½" by ¾", the other piece should be about ½" by ¼". You should have 2 pieces, looking something like this:
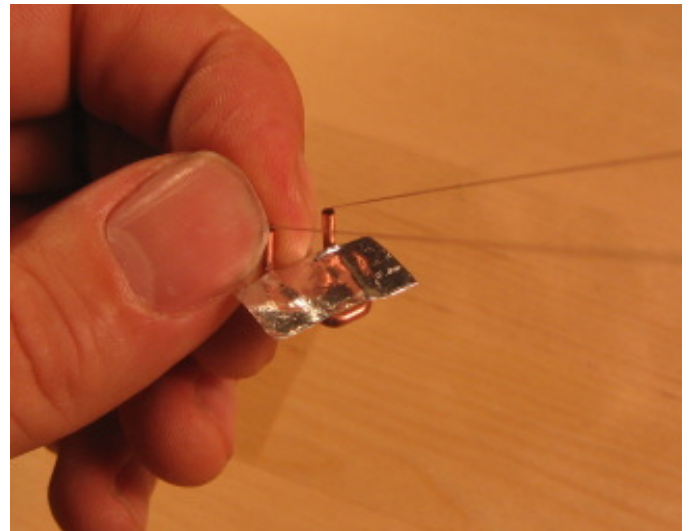

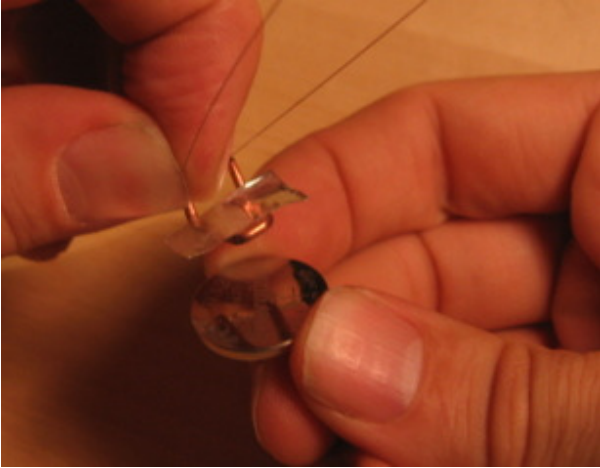Next, carefully peel the backing off of the *larger* piece:

Try not to touch the sticky side, or it won't stick as well. (This foil has a special adhesive that conducts electricity, to help your Blinkybug light up).

Now pick up your antennae / copper tube assembly, and position the foil, sticky side down, over the lower, bent portion of the copper tube, like so:
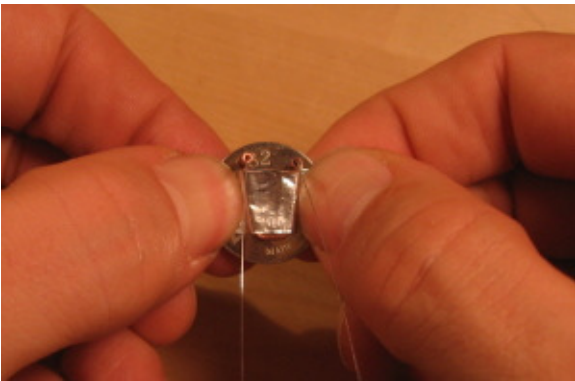

There should be about ¼" of extra foil extending from either side of the copper tube.

Next, pick up your battery, and position the antennae assembly over the *positive* side of the battery (this is the smoother, shinier side with the "+" sign):
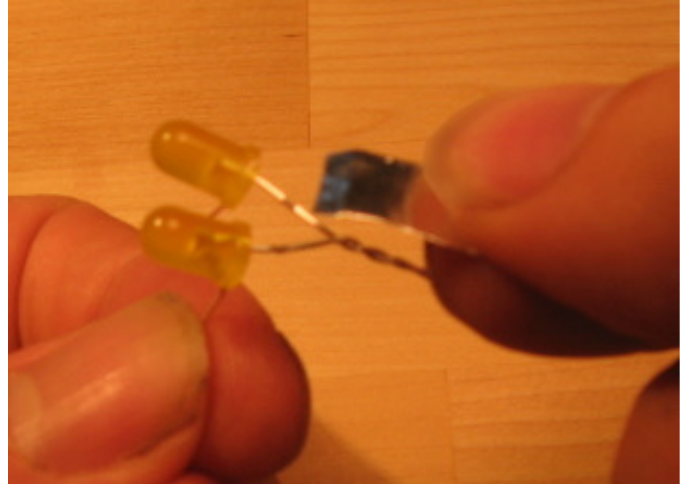

Now press the foil tape so that it sticks to the surface of the battery:
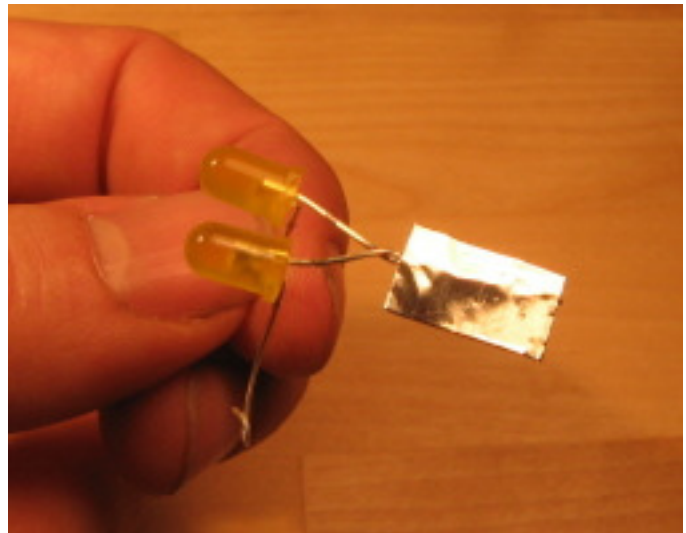

If the tape reaches the edge of the battery, that's OK… but if it wraps around to the other side of the battery, make sure you trim the foil back with some scissors. You should now have something that looks like this:

Put the antennae / battery assembly aside for now. Next, grab the remaining, smaller piece of foil tape, and peel off the backing. Pick up the LED eyes, holing on to them by one of the looped leads, and hold it upside down. Position the foil against the *twisted* LED leads, like so:
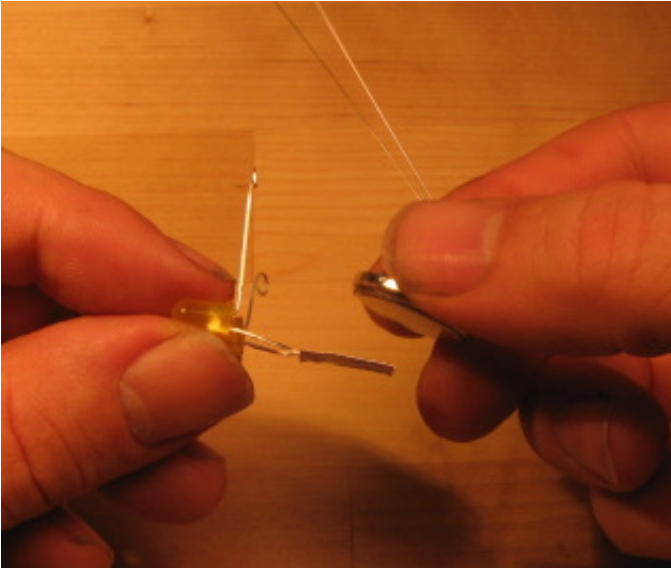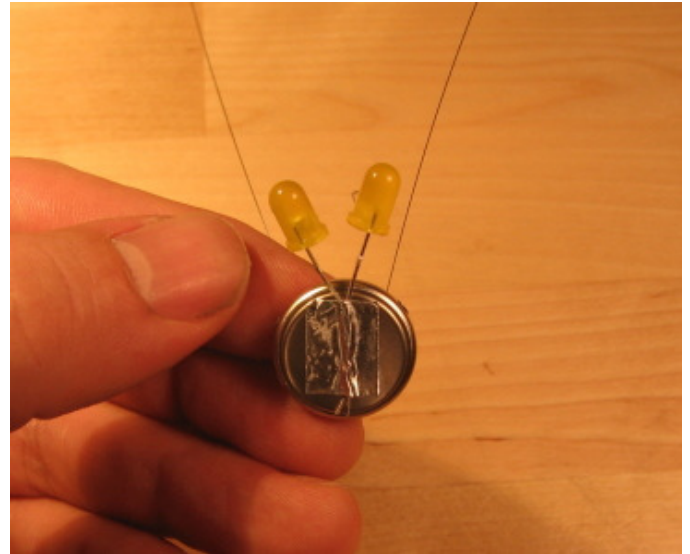

You should have something like this:

Note that in the picture above, we're looking at the non-sticky side of the tape.

Now we're going to attach the LEDs to the battery. Position the sticky side of the foil that is attached to the LEDs against the bottom (the negative side) of the battery, like so:
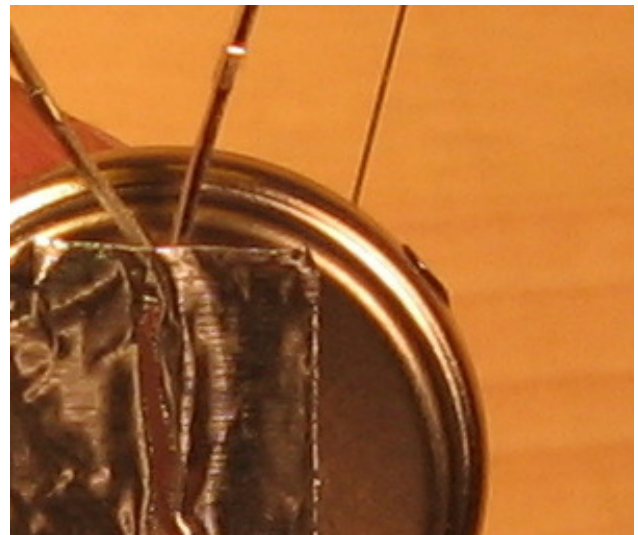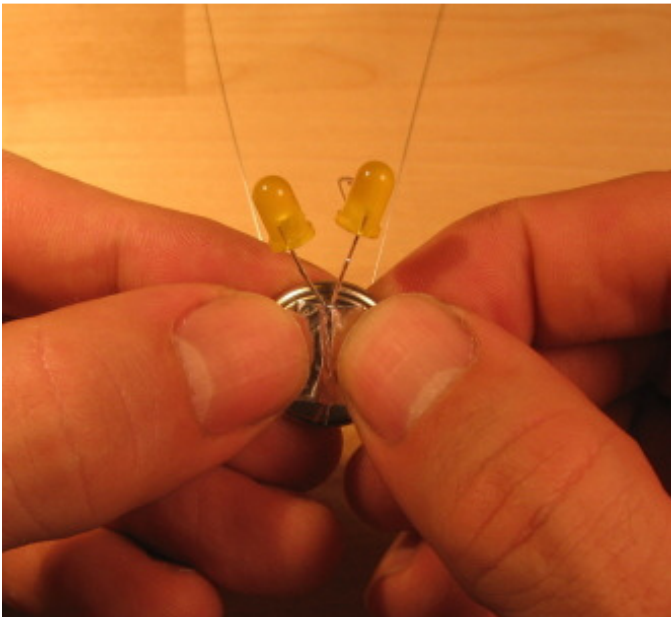
Now firmly press the tape against the bottom of the battery, working it in to all the nooks and crannies so that it will stick well:
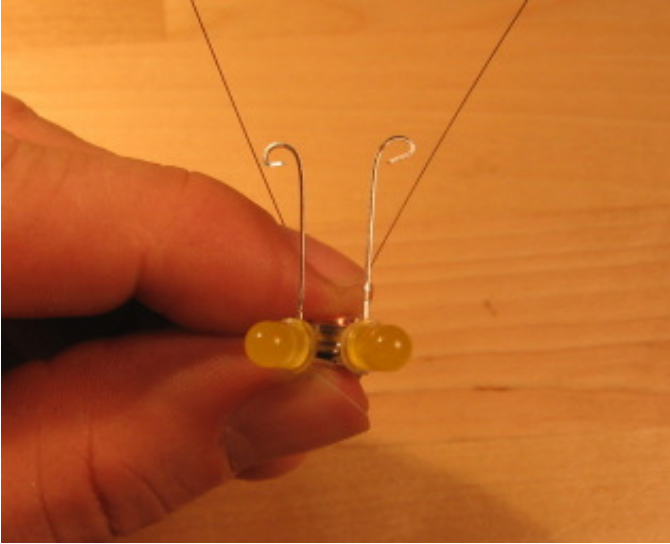
You should now have something that looks like the following picture:

IMPORTANT: Make sure the foil does not touch the side of the battery! It shouldn't get any closer than this:
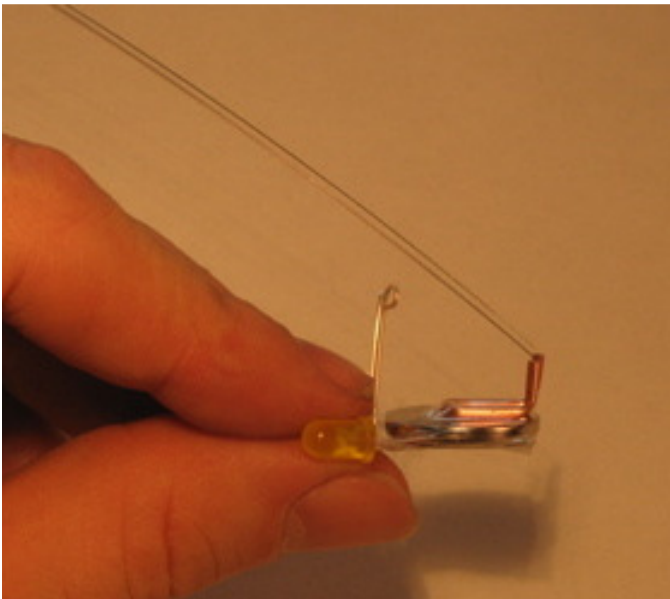
If it does, peel it back and trim it with the scissors.
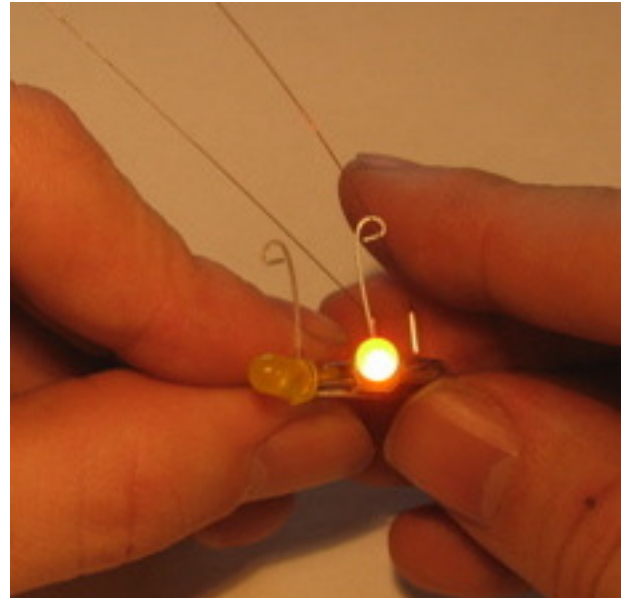
You should now have something that looks like this:

Here's a side view:

If something doesn't seem quite right, don't worry… just carefully peel off the tape and try again (there should be enough tape in your kit for 4 bugs, plus a little extra).

Now it's important that you *test* your blinkybug. *Gently* bend one of the antennae wire (don't crimp it) so that it touches one of the looped LED leads; that LED should turn on. Do the same for each LED:
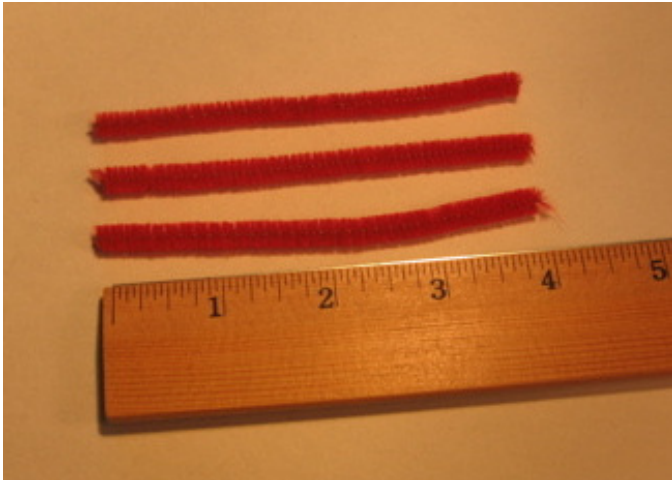

If they turn on… great. If not, there are a few things to try:

- Re-tape. Sometimes just un-taping the eyes and antennae from the battery and re-taping will do the trick.
- Look for short-circuits. Are the negative (twisted) LED leads touching the edge of the battery? The positive side of the battery extends onto the edges so you have to be careful with this. A bit of adjusting or re-taping should do the trick. Also make sure the tape on either side is wrapping all the way around the battery.
- LEDs are "backwards." Perhaps there was a mixup somewhere and the positive and negative LED leads of the eye assembly are reversed. There is an easy solution to this: just flip the battery over, and treat the positive side as the negative, and vice versa.
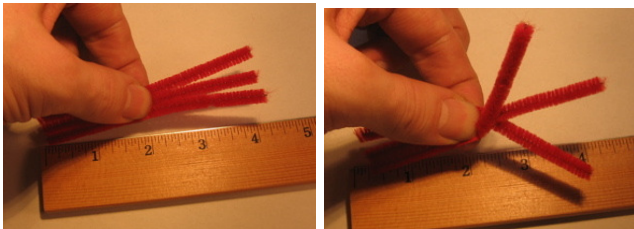
Put the LED / battery / antennae assembly aside for now.
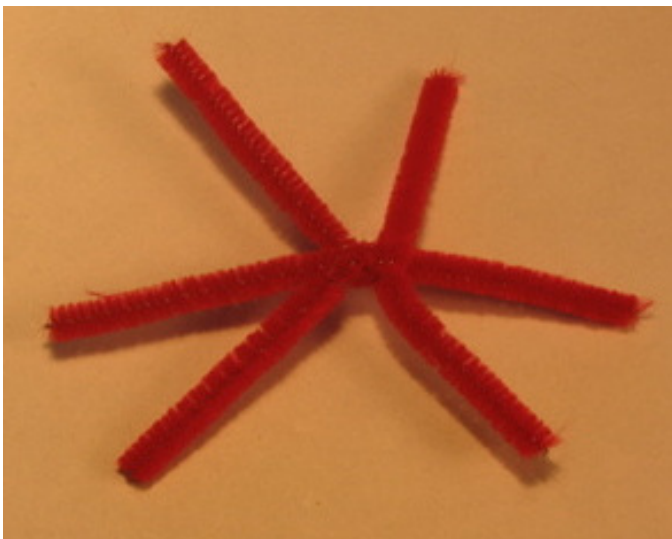
4. Attaching the Legs

Grab a 12" length of pipe cleaner with your wire cutters. Cut it into three 4" pieces:

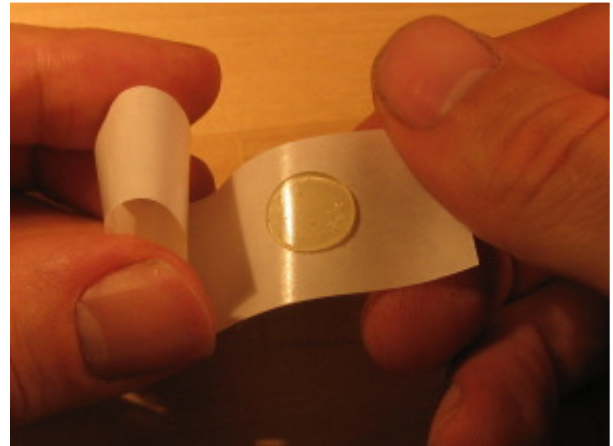Grab the all three pieces at their mid-section (2") and spread them out a bit:

Now give them a few twists at the mid section, so that you have a star-shaped thing, like this:
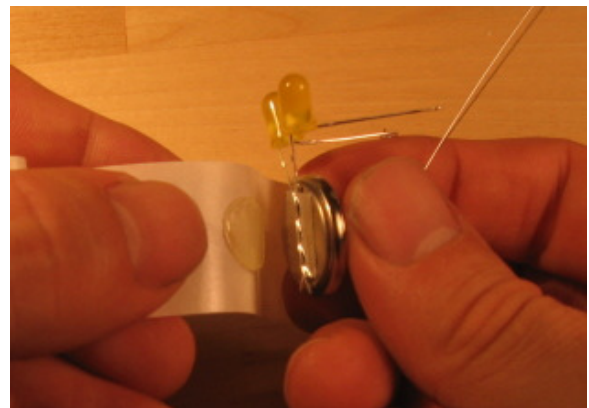

Each "leg" should be about the same length… but close enough is good for now! Put the leg assembly aside for the moment.
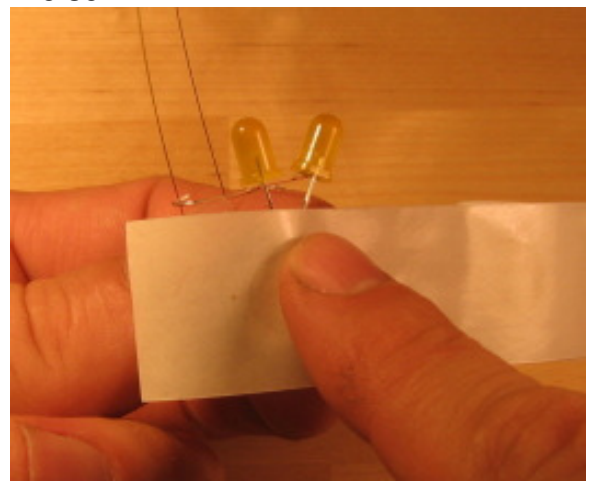
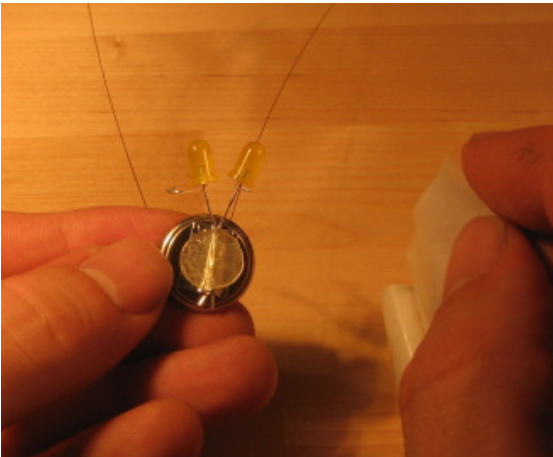Pick up the roll of glue dots, and gently unroll it, exposing a single dot:

Try not to touch the dot itself (this will decrease its stickiness). Place the exposed dot against the bottom of the bug assembly, against the negative side of the battery, and directly over the twisted LED leads:
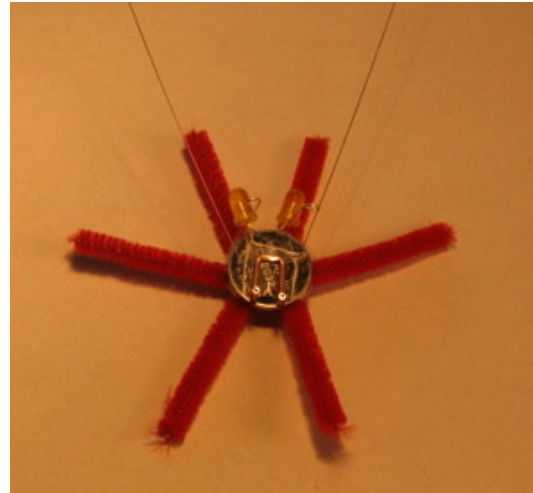

Firmly press against the backing, so that the glue dot adheres to the bottom of the battery, like so:
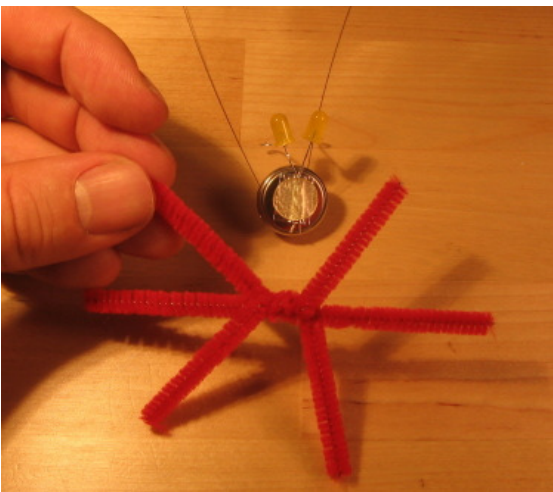
\Now carefully peel away the backing. The glue dot should stick to the bottom of the battery, as in this picture:

Now pick up the leg assembly, which will be attached to the bottom of the battery:

Position the legs over the glue dot, and firmly squeeze the legs into place:

You should now have something that looks like this:

If the legs seem uneven, you can trim them with wire clippers:

You can now bend the legs into the fun bug-like pose of your liking:
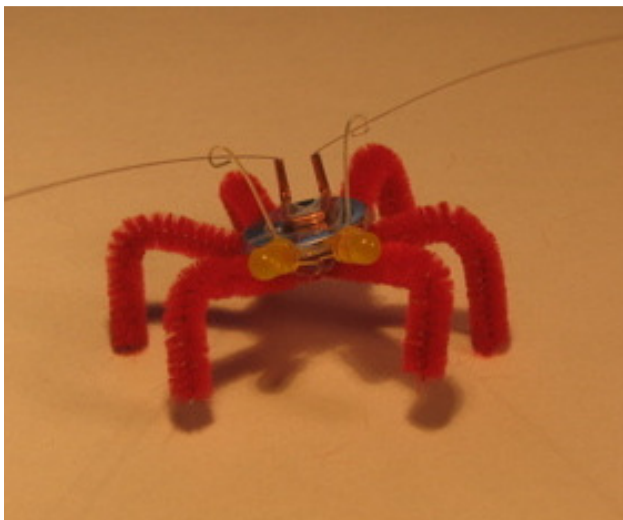
12

Alternate Gluing Method:

For a slightly sturdier bug, you could also use a *low-temperature* hot glue gun in place of the glue dot. After assembling the legs, place a small blob of glue on the underside of the bug (the negative side of the battery), then carefully press the leg assembly into place, being very careful not to touch the hot glue! Give it about 30 seconds to set.
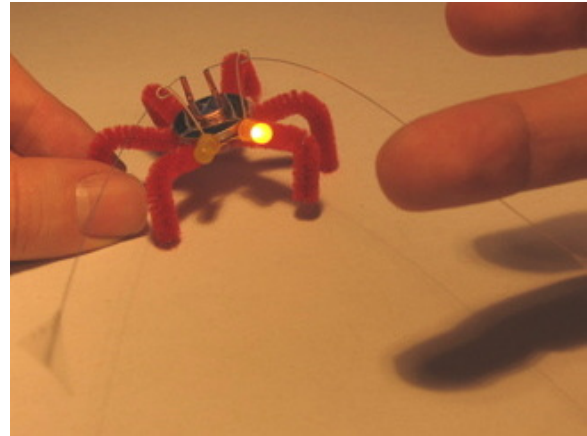
5. Aligning the Antennae

Here comes the trickiest part… but first, a brief explanation of how Blinkybugs work: When your bug is complete, the antenna wire will pass through the little loops at the end of the LED leads. When the bug is sitting there undisturbed, the antennae should pass through the loops without touching the sides; because this part of the bug acts like a switch, the eyes will be off. However, when something makes the antennae move, they will tap against the loops, letting power from the battery flow to the LEDs and causing them to blink.
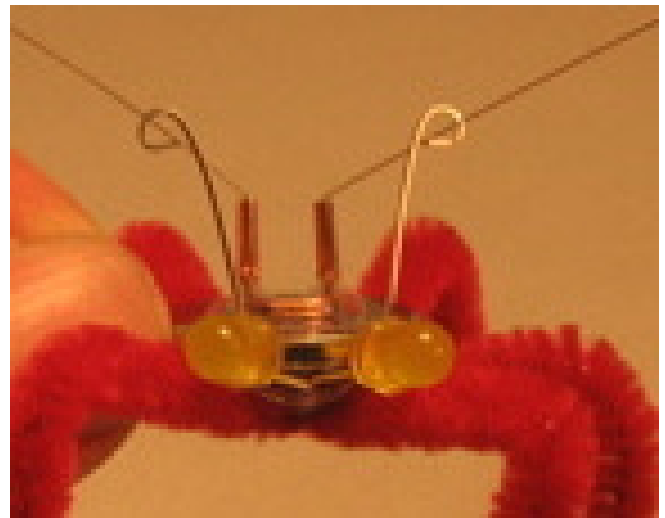
Here is a finished Blinkybug is "at rest;" its antennae pass through the loops without touching:
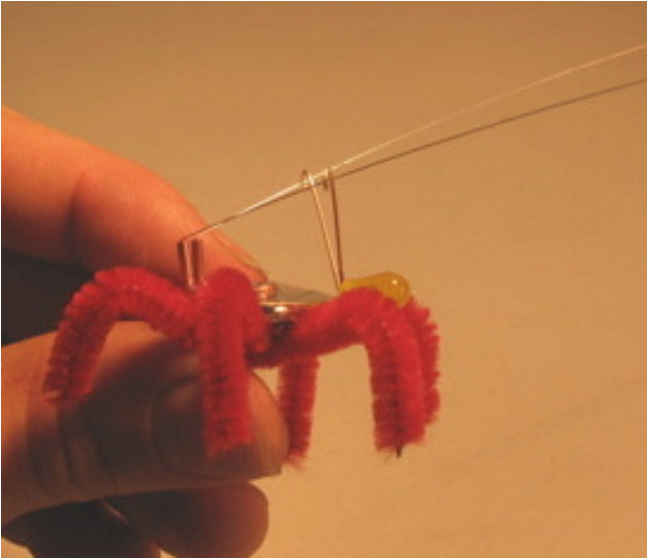

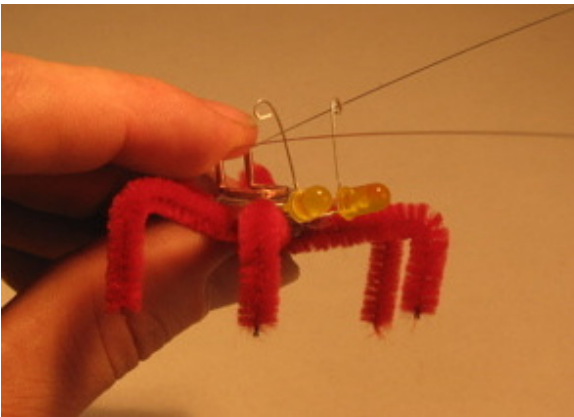When an antenna is moved slightly, it contacts the loop and turns that eye "on:"

The trick is to precisely align the antenna wire inside the loops. You should have left a small gap in the loops; if not, use the pliers to gently open up each loop just a bit. Now gently pull each antennae wire into each loop. It should look something like this:
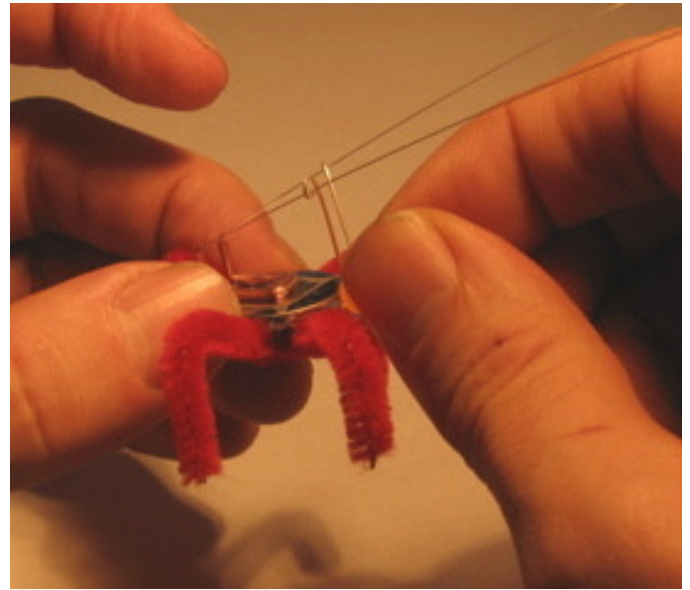
And here is a side view:

To get everything lined up just right, you will probably need to make some adjustments. If an antenna wire is way off, you can gently crimp it where it comes out of the copper tube, as you did earlier (the antenna may need to come out of the loop to do this):

For more fine adjustments, hold the body of the bug while gently positioning the loop by grabbing the LED lens or the lead itself:

Getting everything just right requires some patience, so don't get frustrated… once you get the hang of it, you'll be able to adjust your bug so its eyes blink on only when the antennae move.

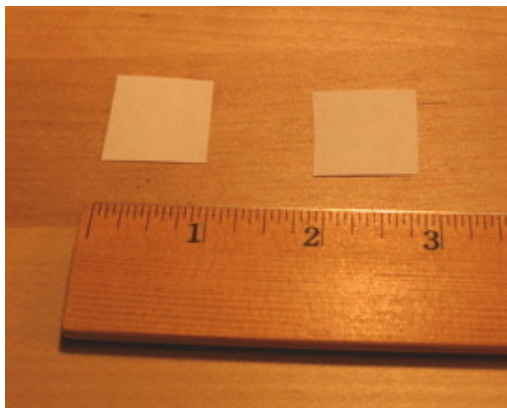Congratulations! You now have a working Blinkybug… enjoy!

Taking Care of Your Blinkybug

Blinkybugs are delicate and need to be handled carefully; however if you take good care of it and keep it adjusted so that its eyes are not stuck "on," it should last a long time.

Disabling Your Bug

If you ever need to pack up your bug, it's a good idea to temporarily disable it so that it does not get stuck "on" and drain its battery. Here is one way to do this:
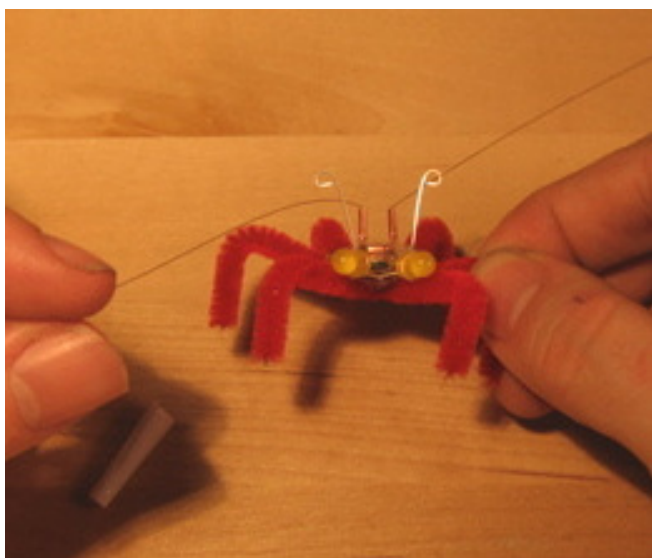
Cut 2 1"-square pieces of paper (you can use the backing from the glue dots):
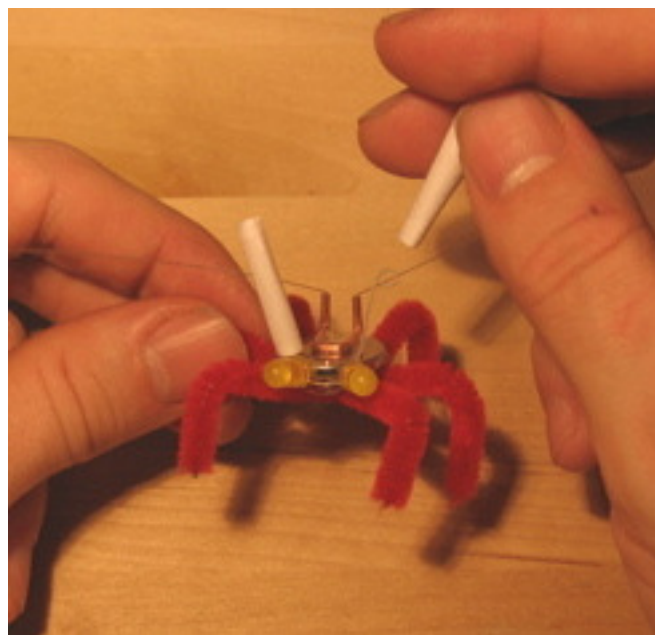
Using a bit of tape, roll them into little tubes about 3/8" in diameter:
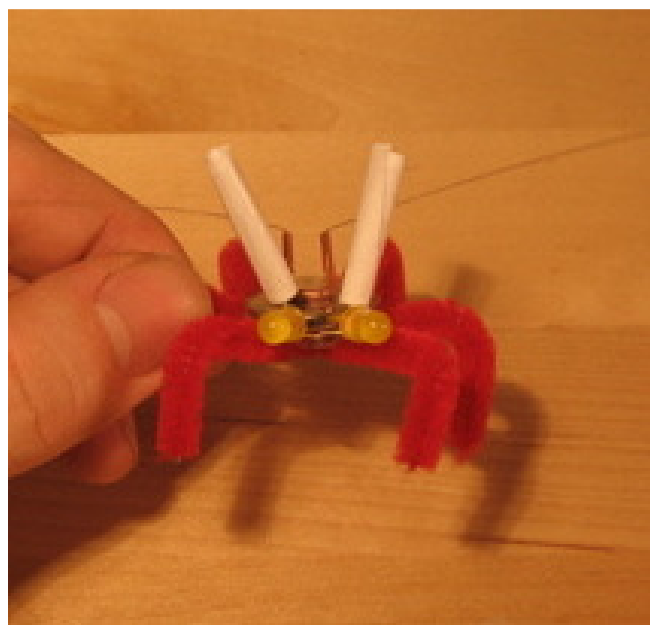

Gently pull each antenna out of its loop through the gap (opening up the gap if necessary):

Slip each tube over each looped antenna lead:

Your Blinkybug, which now appears to be wearing a funny little hat, will not blink, as the paper acts as an insulator between the wire and the LED leads.

You can now carefully roll up your blinkybug in a piece of newspaper or bubble wrap, and pack it in a box. Make sure it has enough room so that the antennae don't have to bend too much.

Questions? Comments?

If you have any questions, comments or problems building your Blinkybug, feel free to get in touch by sending an email to:

help@blinkybug.com

You can also share tips with your fellow bug-makers by joining the *blinkybug-kit* group. To join, send an email to:

blinkybug-kit-subscribe@yahoogroups.com

More Stuff

Please come back to our web site from time to time (*www.blinkybug.com*) to see what new things we've come up with!

Thanks and enjoy!