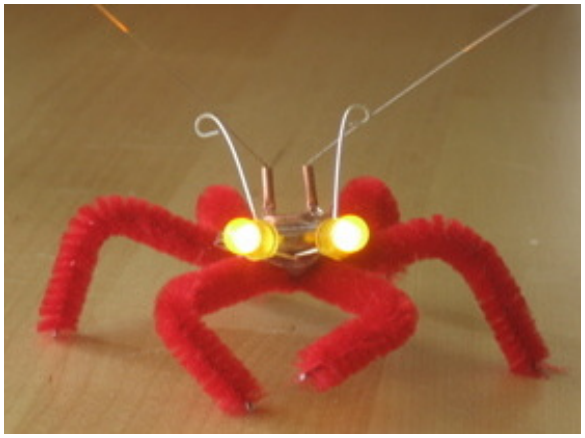
Blinkybug Kit Instructions v1.1

www.blinkybug.com



What is this thing?

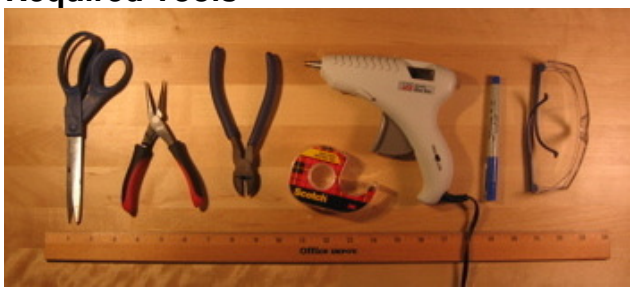
Blinkybugs are simple little electro-mechanical insects that respond to movement, wind, and vibrations by blinking their LED (light-emitting diode) eyes. Despite their simplicity, they have a strangely lifelike quality.

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

Required Tools



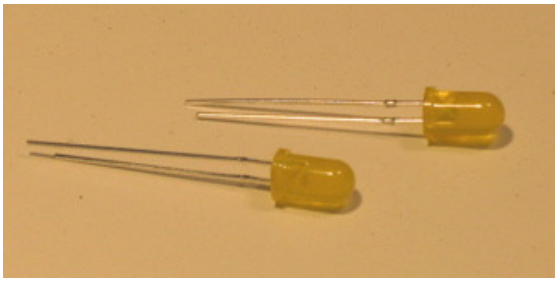
Before getting started, you should have the following tools on hand:

- Scissors
- Needle-nose pliers
- Wire cutters
- Cellophane tape (e.g. *Scotch* tape)
- Dual-temp or Low-temp hot glue gun
- Glue sticks
- Permanent marker (e.g., a *Sharpie*)
- Goggles! (when working with hot glue)
- Ruler, yardstick or measuring tape

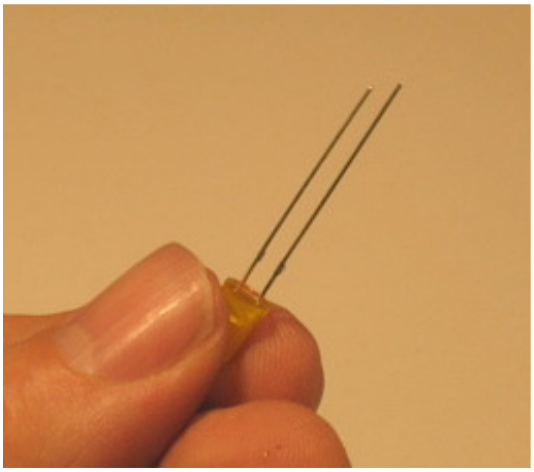
Building your bug

1. Preparing the LED "eyes"

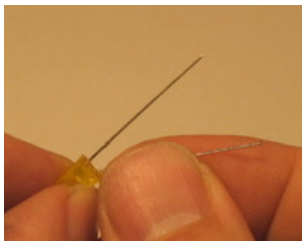
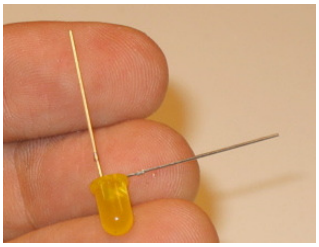
Grab 2 LEDs of the same color (or different colors, if you like):



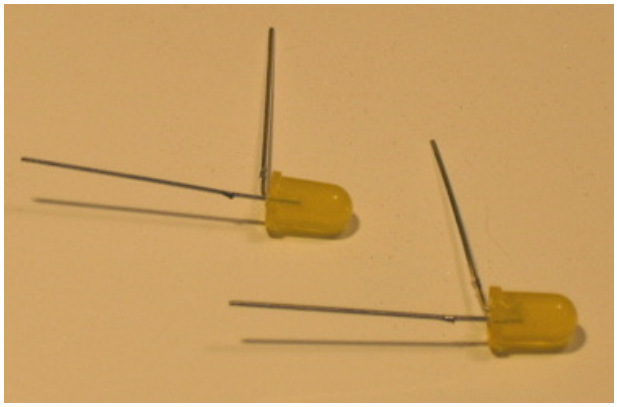
Notice that each LED has 2 wire leads, and that one lead is slightly longer than the other. The long lead is the "positive" lead… this is important, as LEDs need to be oriented the right way, or they don't work!



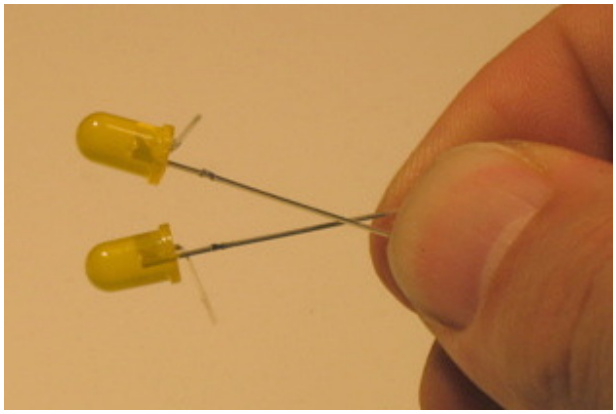
Now grab the longer, positive lead, and bend it to a 90º angle:

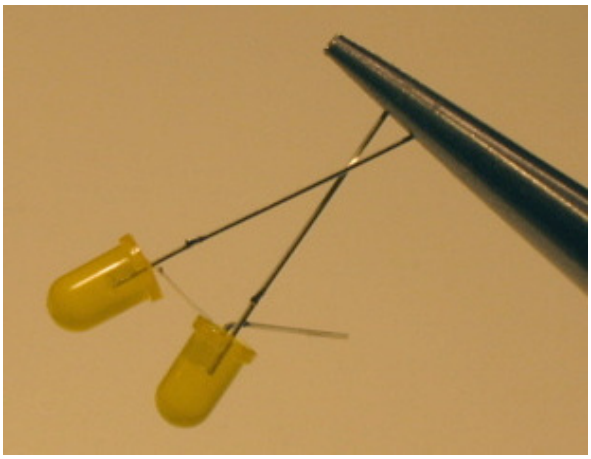
Do the same for the positive lead on the other LED. They should look like this:



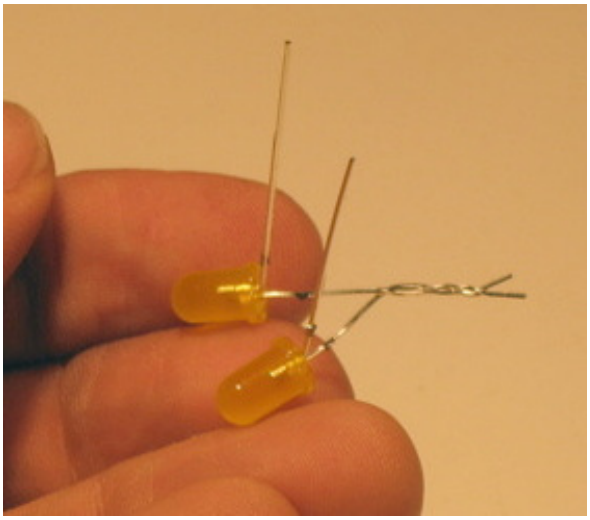
Next, you want to twist the 2 shorter (negative) leads of the LEDs together. First, with the LEDs pointing in the same direction, and the positive leads parallel to each other, cross the ends of the two negative leads, like so:



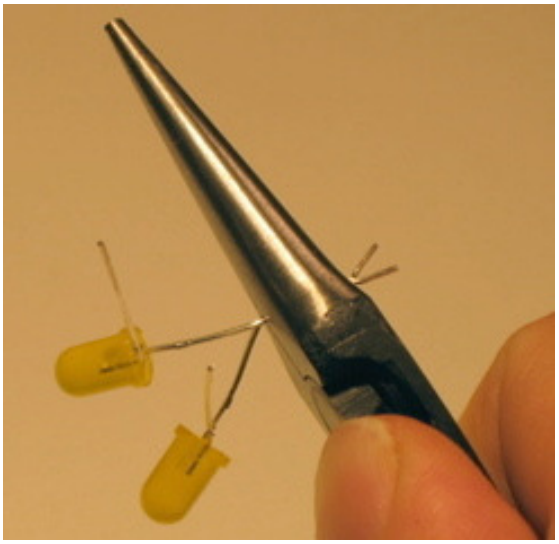
You may find it helpful to use your pliers for this part, as seen here:



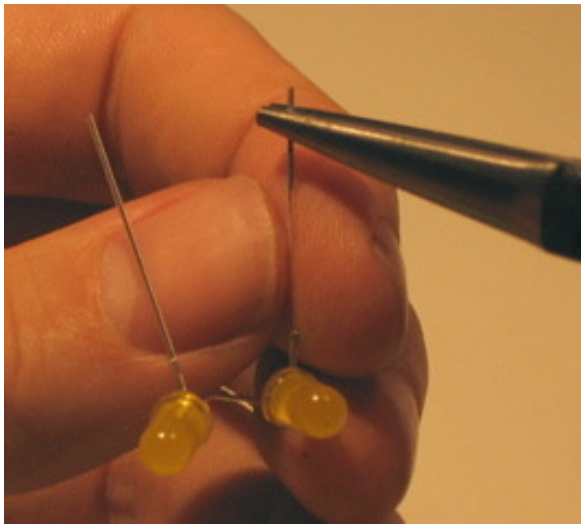
Now, using the pliers or your fingers, give the leads about 3 or 4 twists. The result should look something like this:



You may notice a bit of "jiggle." This is easily remedied by giving the twisted leads a good squeeze with the pliers, like so:

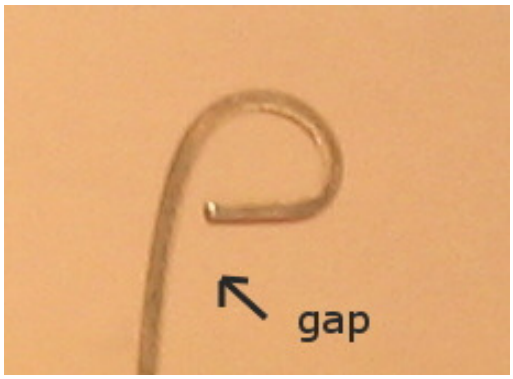


Next you will add little loops to the ends of the positive leads. With the pliers, grab the end of one of the positive leads:

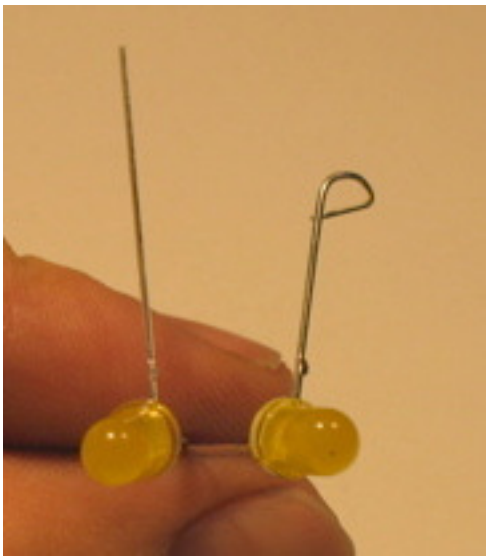


Now give it a twist in the *outward* direction, making a small loop:

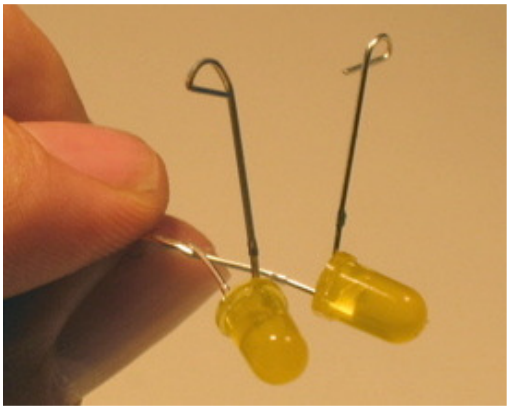
Don't close the loop completely; leave a small gap:



It should look something like this:



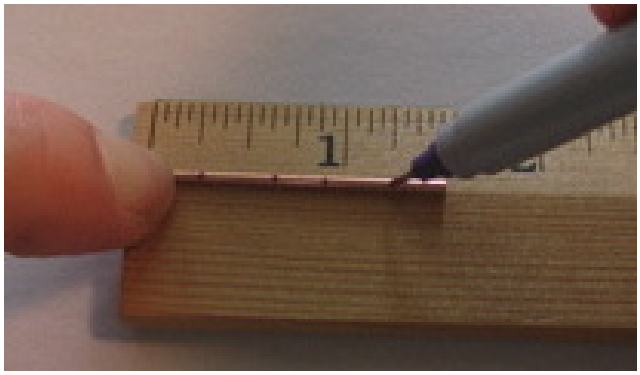
Now create a loop on the other lead in the same manner, twisting it in the opposite direction. Here are what the completed "eyes" should look like:



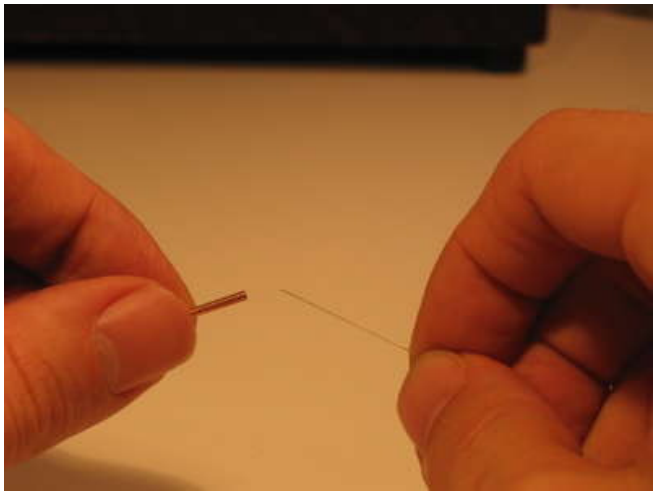
2. Preparing the Antennae

Grab one of those little copper tubes, your ruler, and a permanent marker. Mark the tube at the following measurements:

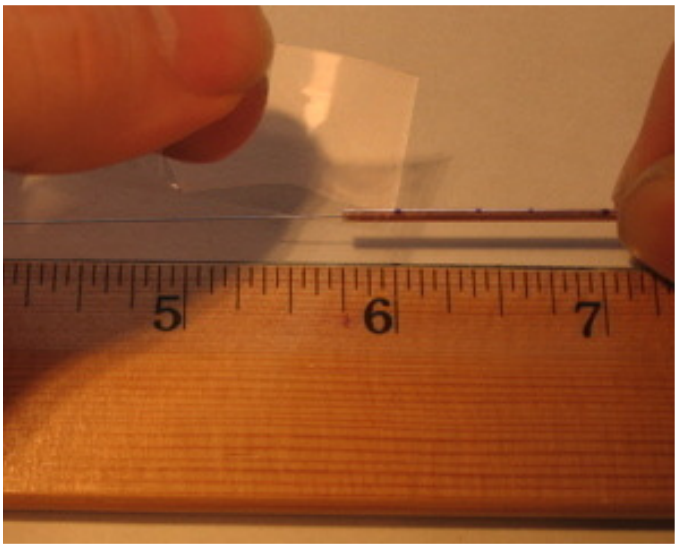
- 1/4"
- 5/8"
- 7/8"
- 1 1/4"



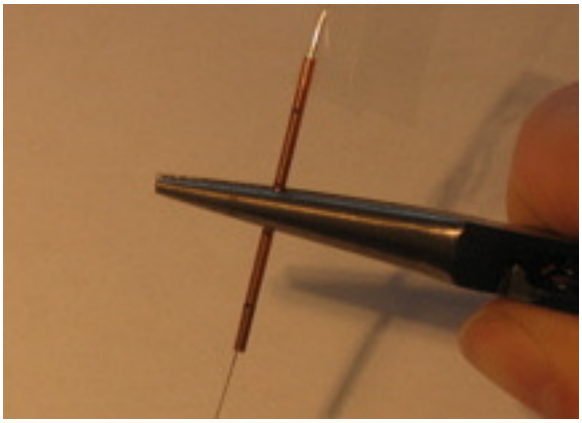
Grab the spool of music wire (the flexible thin wire), and cut a 13” length using your wire cutters. Now insert the music wire into the copper tube:



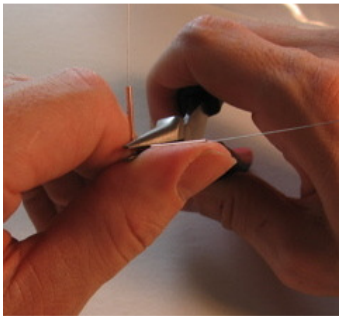
Slide the tube about ½ of the way down the length of the wire. Use the ruler to help center it; there should be 5 ¾” of wire extending from either end of the tube. You use a little piece of tape to help keep the wire in place, like so:

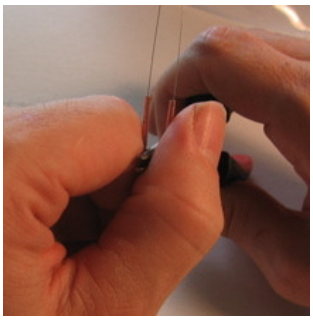


Now, with your needle-nose pliers, grab the copper tube right between the two center-most marks (those at 5/8” and 7/8”); you should have equal amounts of copper tube and wire extending from either side of the pliers:

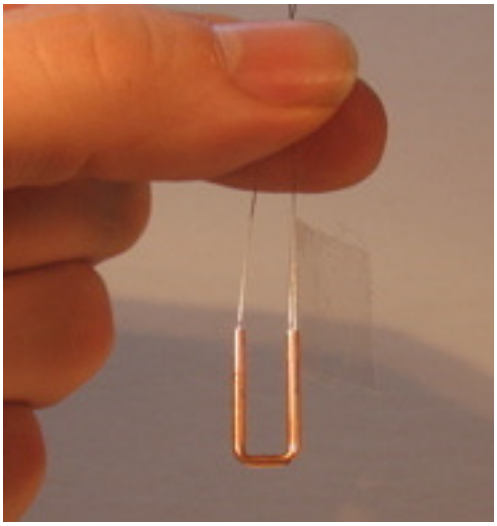


Next, using your thumb while firmly holding the copper tube in place with the pliers, bend each end of the copper tube 90°:

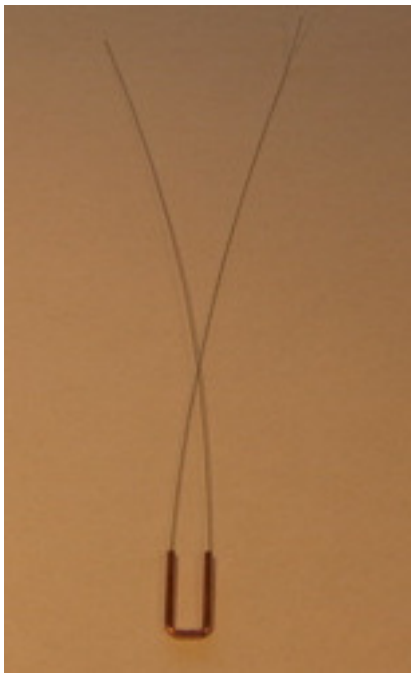




They should be bent in the same direction, so that they are parallel. It should look like this:

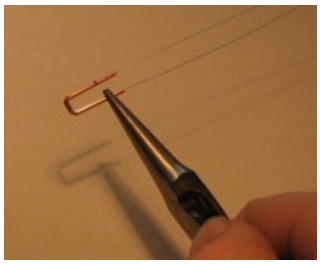


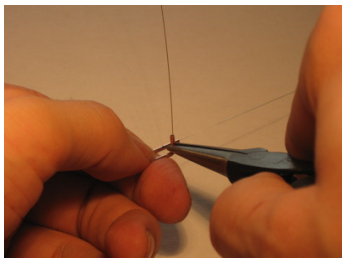
If one section of copper tube is slightly longer than the other, don't worry about it… this is not an exact science! You can now remove the bit of tape. Here is another view of what we have so far (don't worry if the wires cross like this or not):



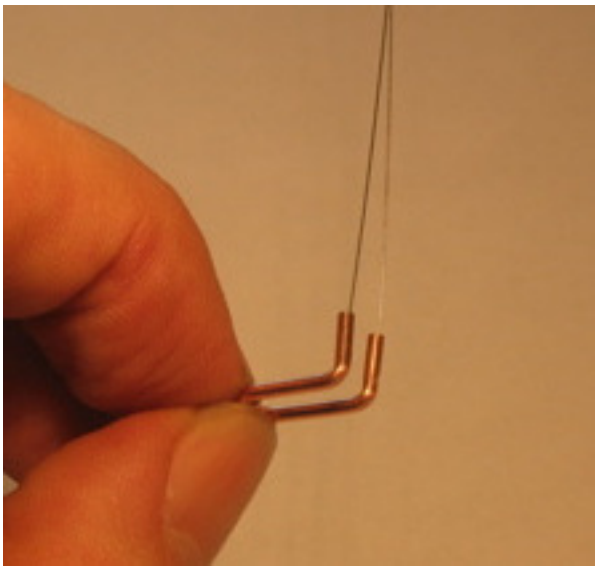
If one "antenna" is slightly longer than the other, use the wire cutters to even them out.

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

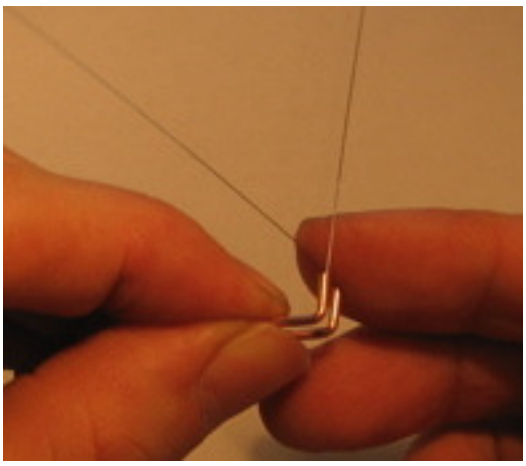




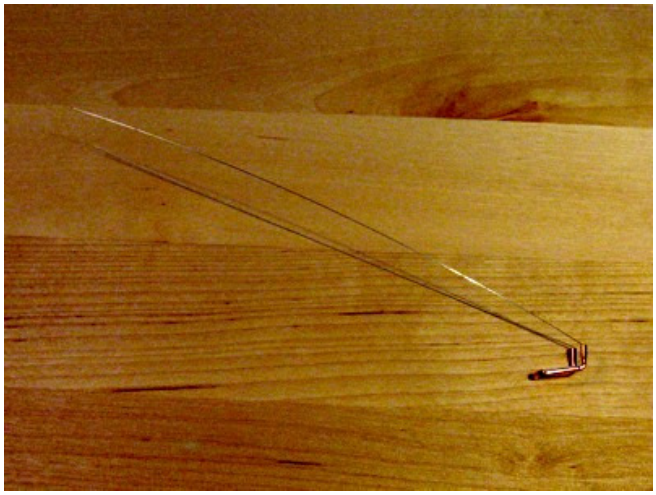
You should have something that looks like this:



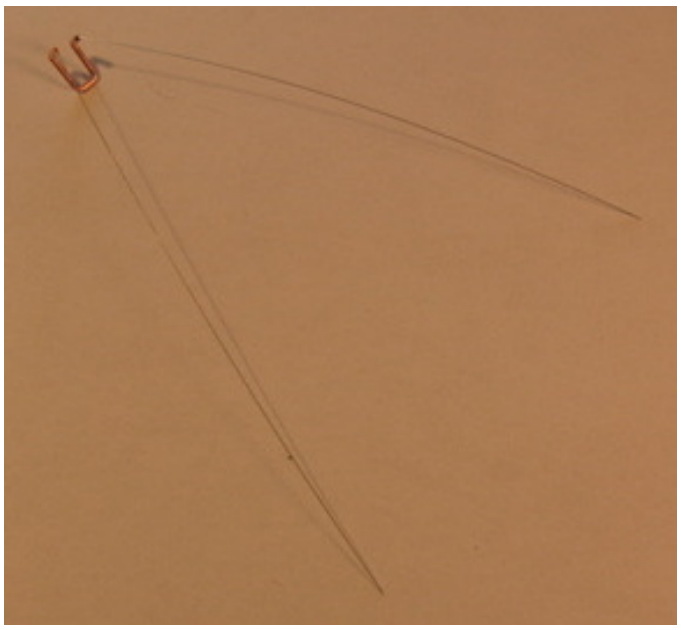
Next you need to bend the music wire where it exits the tube so that it sweeps forward—that is, in the same direction as the bent copper tube. Because this wire is "springy," you need to really mash it a bit with your finger. Push down firmly on the wire as shown here:



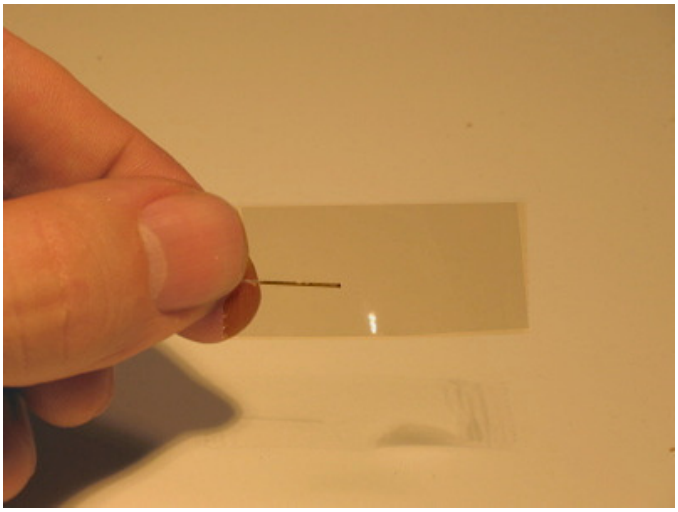
After you do that for each section of wire, it should look like this:



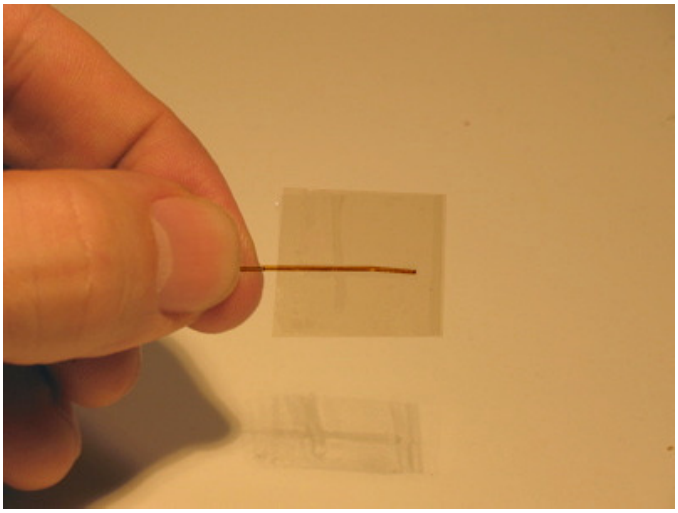
As in the photo above, the wire should be at slightly less than a 45° angle to the "base" of the copper tube, and the antennae should spread out "sideways," creating a roughly 45° angle between them (see below). Again, this doesn't have to be exact at this point… you can fine-tune it later.



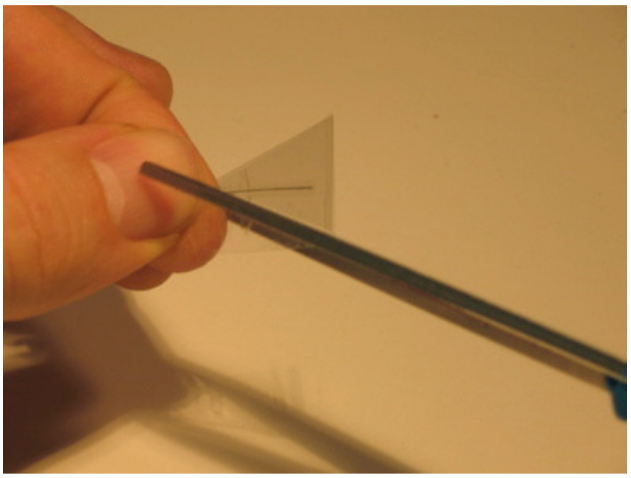
Next, you want to add little flaps to the ends of the antennae; this will make it far more sensitive to light breezes. Tear off a 1 ½" strip of cellophane tape, and stick it on the end of one of the antennae so that the end of the wire extends about half-way down the length of the tape:



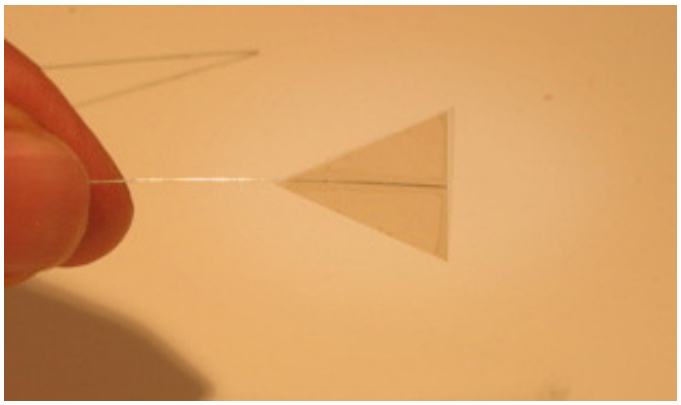
Now fold the bit of tape that extends past the wire back over the wire so that the tape sticks to itself. You should now have a little square-ish tab of tape on the end of the wire, without too much (or any) of the sticky side exposed:



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



You should have something that looks like this:

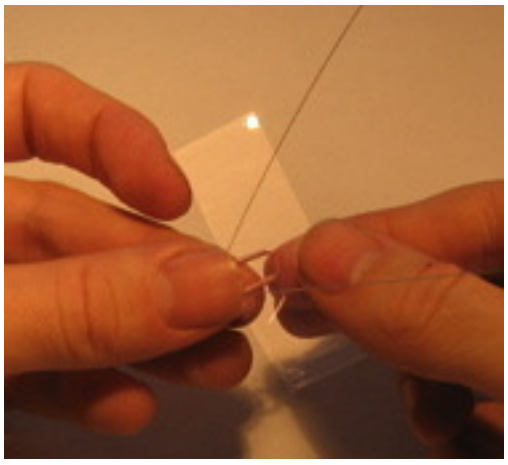


Do the same for the other antenna.

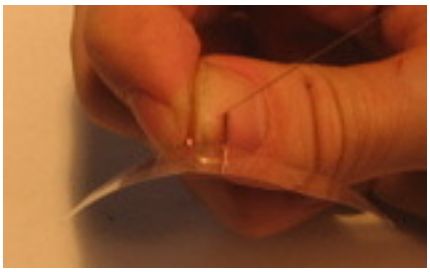
3. Assemble Antennae, Eyes, and Body

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!

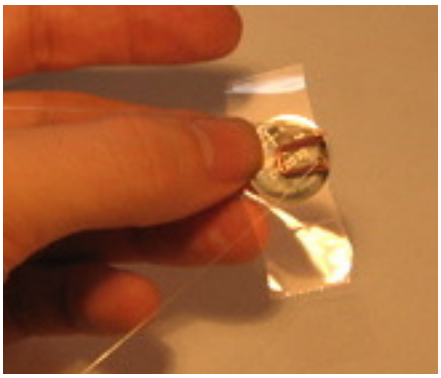
Put the battery aside for now, and tear a strip of cellophane tape about 2" in length. Lay this strip of tape across the "base" of the antennae assembly, so that tape "wings" of equal length extend in either direction:



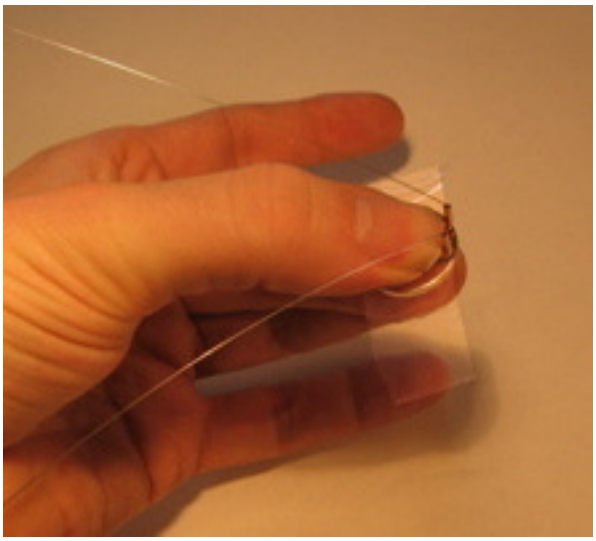
Another view:



In the above photo, the tape is on top of the base of the copper tube, with the sticky side down. Next, lay this antennae/tape assembly on top of the positive side of the battery:

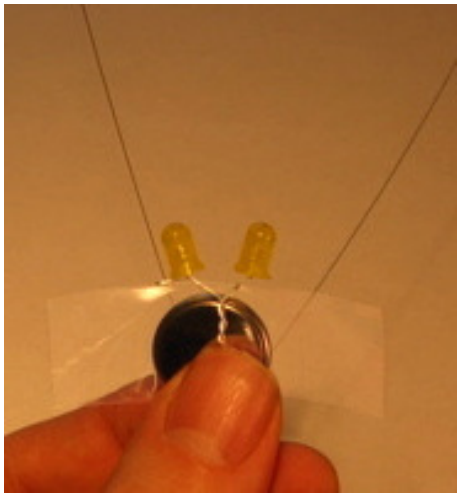


Use your fingers to work the tape into the nooks and crannies around the copper tube, but let the tape wings to continue to extend of either side of the battery.

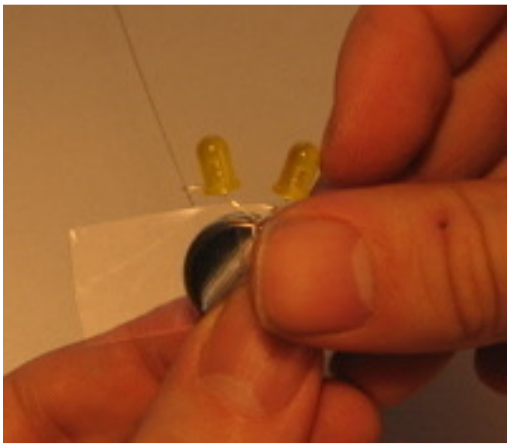


Now grab the LED eye assembly. The twisted-together LED leads will be taped to the negative side of the battery, with the eyes facing forward—the same direction the

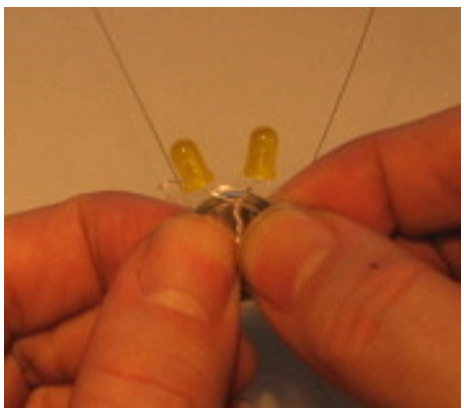
antennae are pointing, with the looped LED leads extending up toward the antennae. Take a look at the next few photos before taping anything into place to make sure this is clear…



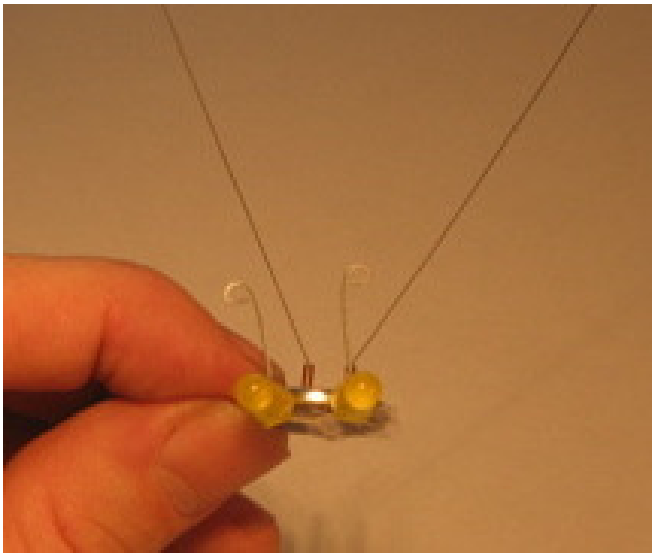
Now wrap each tape wing around the bottom (negative) side of the battery, firmly taping the twisted LED leads in place:



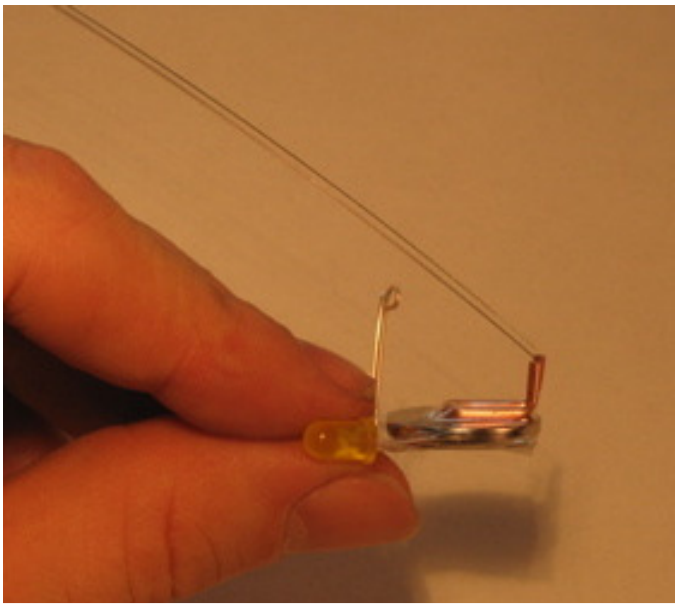
Again, work the tape into the nooks and crannies so that everything is held firmly in place:



You should now have something that looks like this:

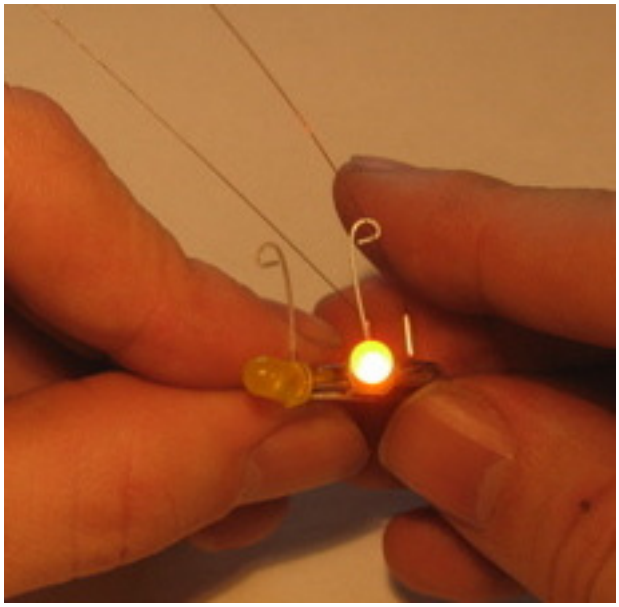


Here's a side view:



If something doesn't seem quite right, don't worry… just carefully peel off the tape and try again.

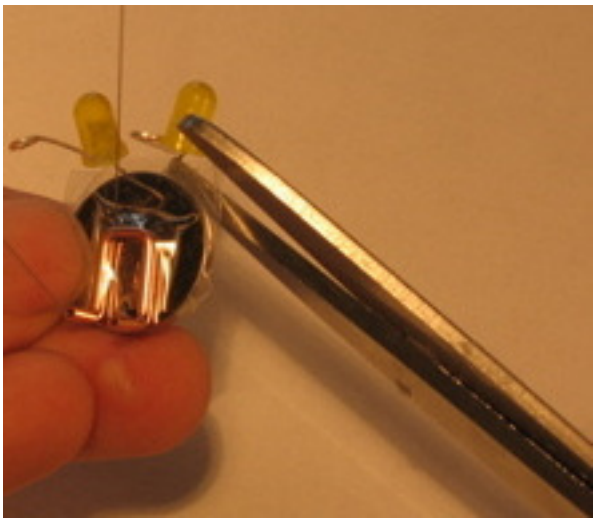
Now it's important that you *test* your blinkybug. *Gently* bend one of the antennae wire (don't crimp it) so that it touches one of the looped LED leads; that LED should turn on. Do the same for each LED:



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.
- 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.

Once it's all taped up and working, you can trim of the extra tape bits with a pair of scissors:

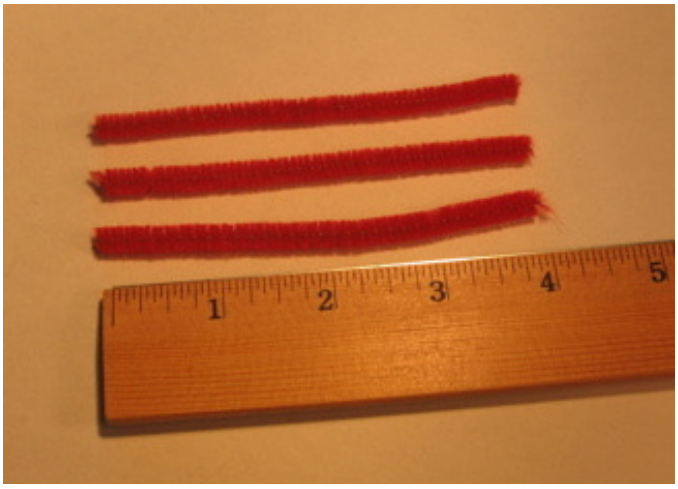


Put the LED / battery / antennae assembly aside for now.

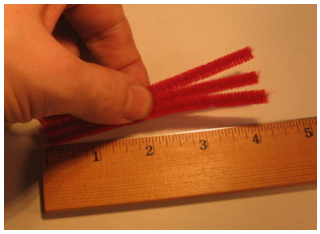
4. Attaching the Legs

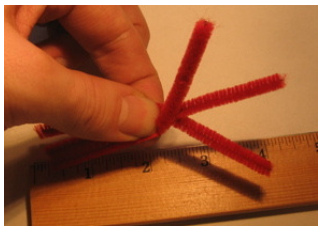
If you haven't done so already, now is a good time to start warming up your glue gun. Set it up somewhere safe and plug it in. If it is a dual-temperature gun, set it to the *low* setting.

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

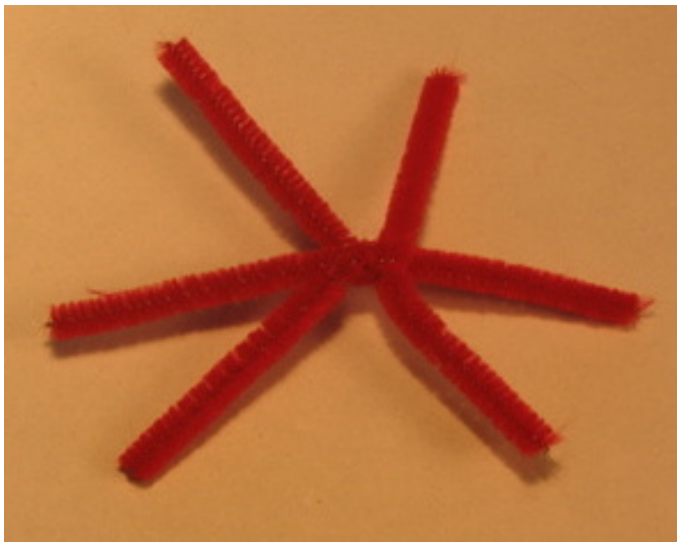


Grab the all three pieces at their mid-section (2”) and spread them out a bit:





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

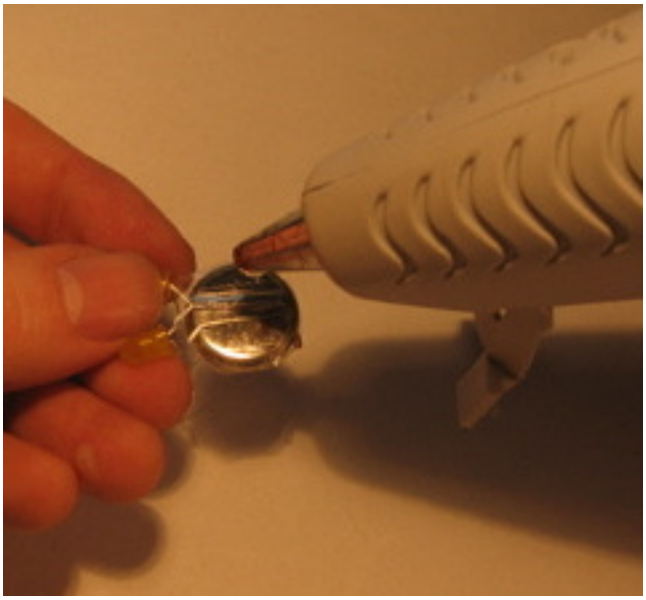


Each “leg” should be about the same length… but close enough is good for now!

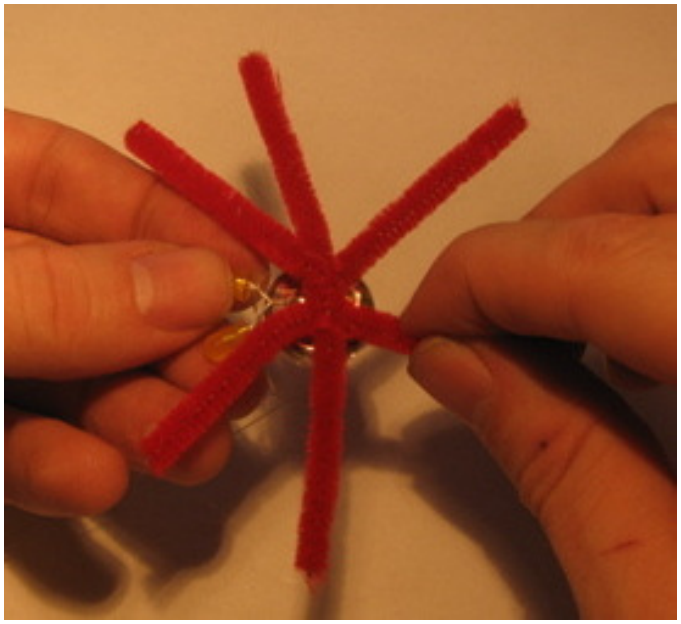
Once your glue gun has had a good 5 minutes to warm up, you are ready to glue the legs to the bug body. **This part requires adult supervision.** Put on safety goggles… it is very unlikely that globs of glue will go flying, but don’t take any chances!

For these next few steps, keep in mind that the glue sets in about 20-30 seconds. This gives you enough time to work, as long as you’re clear on the steps… I suggest you read ahead first.

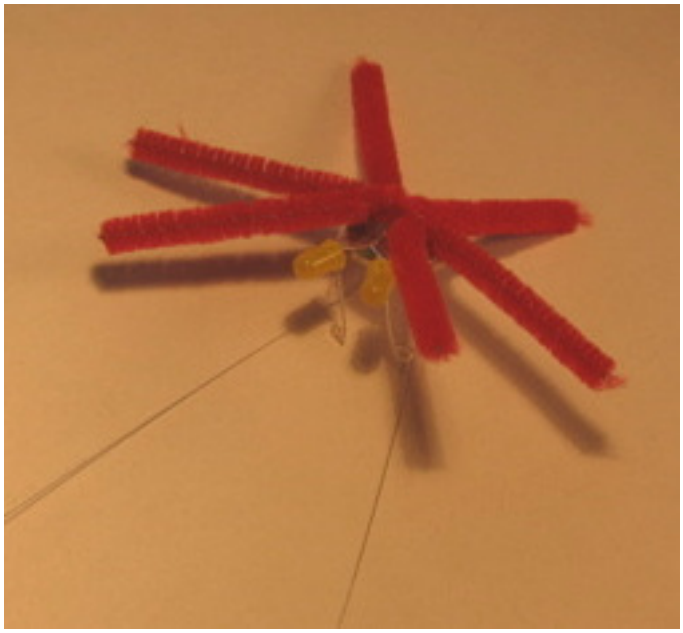
Make sure the pipe-cleaner leg assembly is closely at hand. Now pick up the LED/battery/antennae assembly by the LEDs (use your left hand if you are a right-handed, or vice versa), and flip it upside-down so that you’re looking at the negative side of the battery, where the twisted LED leads are taped. Now with your other hand, take the glue gun and carefully squeeze about a pea-sized glob of glue onto the bottom of the battery:



Now pick up the leg assembly and carefully place it onto the battery so that the point at which the pipe cleaners are twisted together meets the glob of glue:

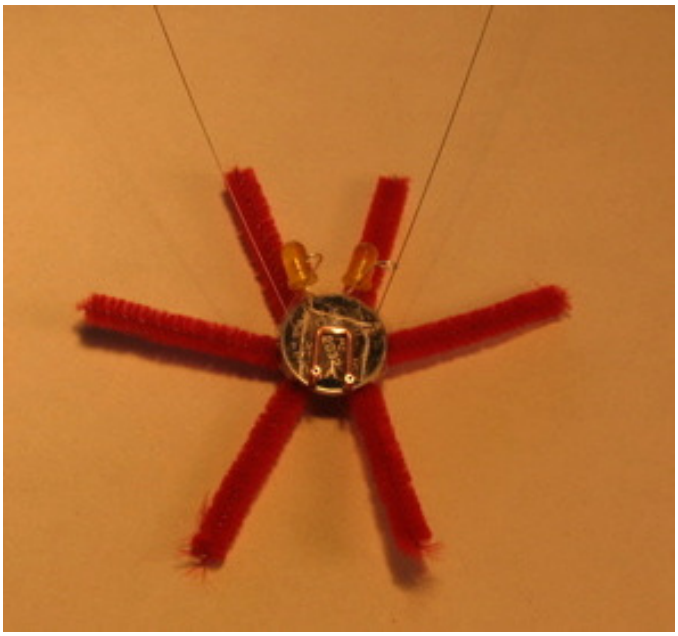


Try not to touch the glue… you may want to use the end of a pen or something similar to press the center of the leg assembly into the glue. Hold this carefully in place for about 30 seconds. You should then gently set the whole thing down, upside-down, as seen here:

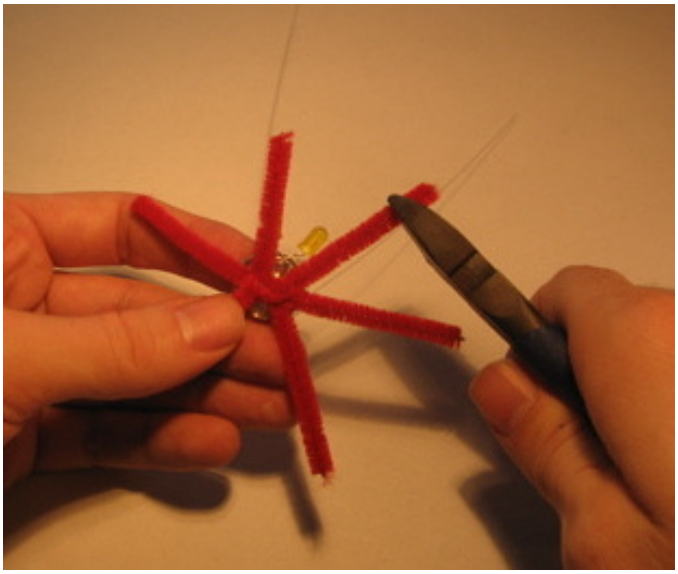


Give it a couple minutes to finish setting, then give the legs a little wiggle… if they still seem a bit loose, carefully add a bit more glue where the legs meet the battery, and let it set again. You are now done with the glue gun… **don't forget to turn it off!**

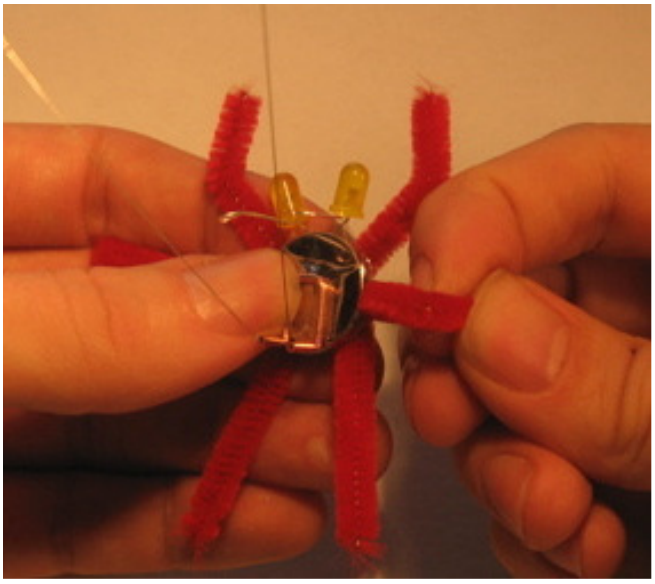
You should now have something that looks like this:



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



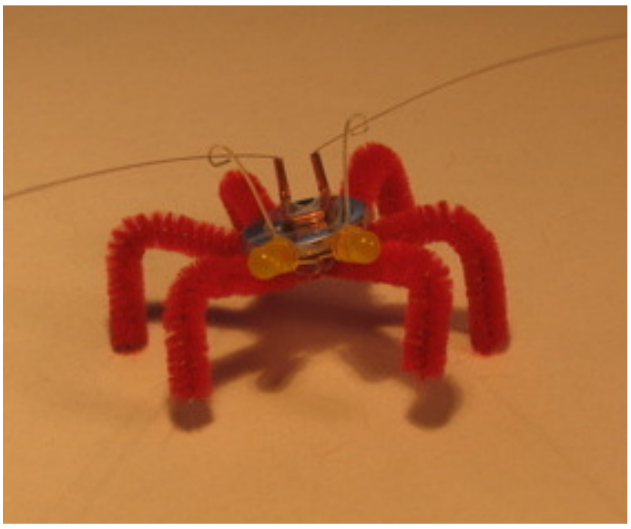
You can now bend the legs into the fun bug-like pose of your liking:



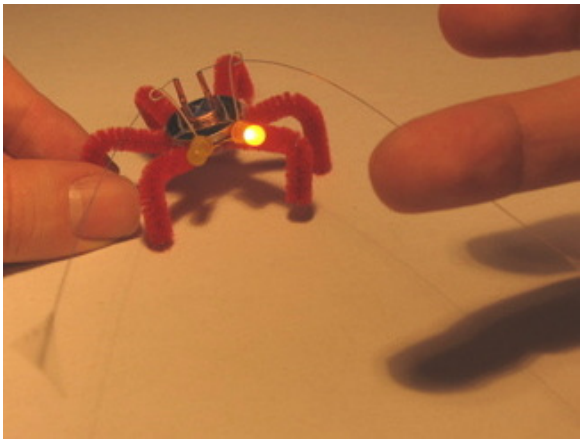
5. Aligning the Antennae

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.

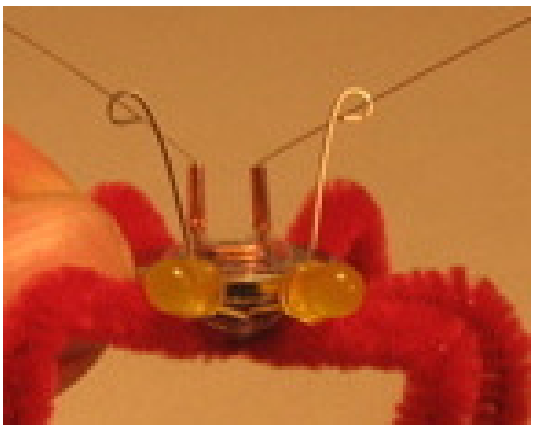
Here is a finished Blinkybug is "at rest;" its antennae pass through the loops without touching:



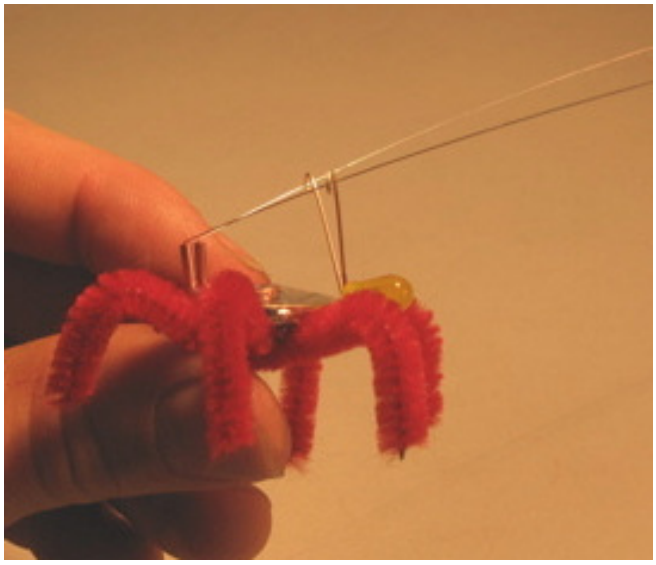
When an antenna is moved slightly, it contacts the loop and turns that eye "on:"



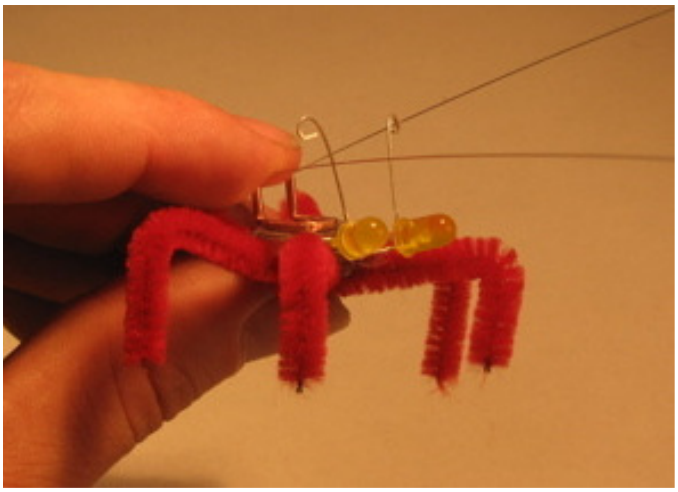
The trick is to precisely align the antenna wire inside the loops. You should have left a small gap in the loops; if not, use the pliers to gently open up each loop just a bit. Now gently pull each antennae wire into each loop. It should look something like this:



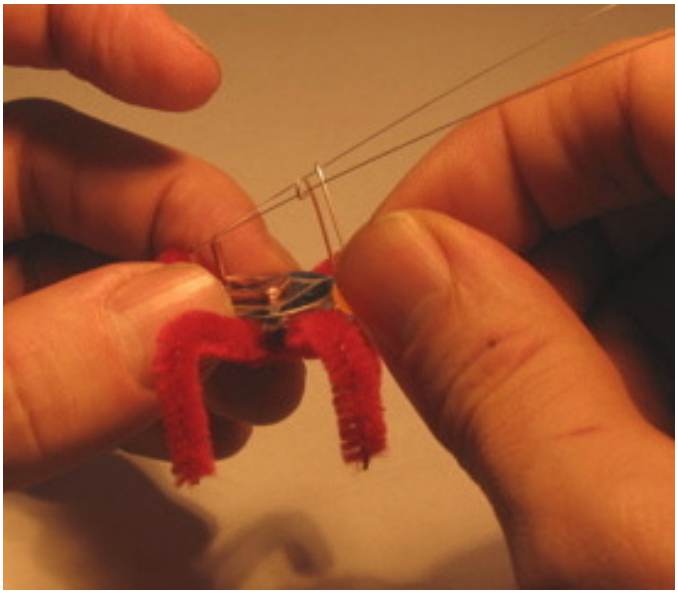
And here is a side view:



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!

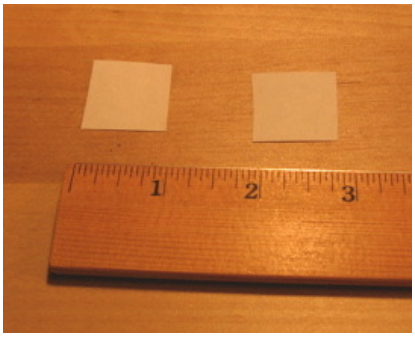
Taking Care of Your Blinkybug

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.

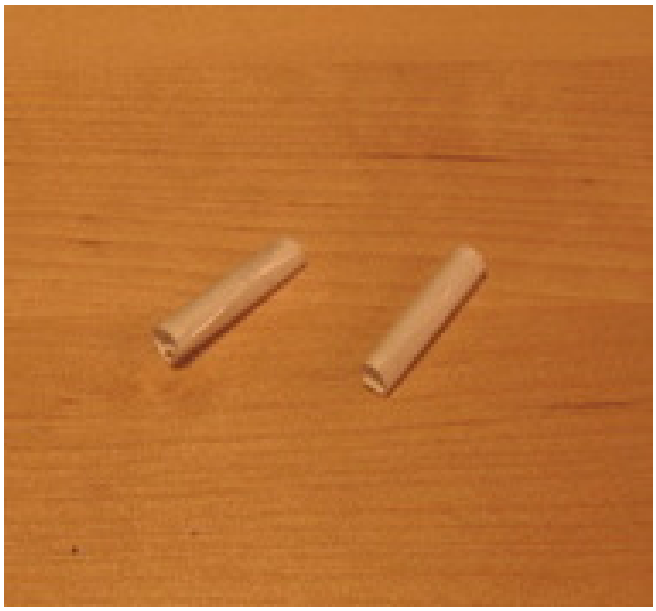
Disabling Your Bug

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:

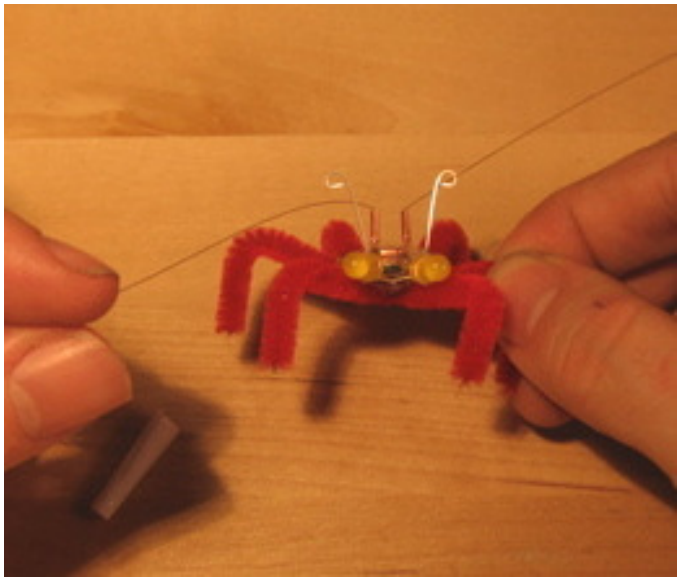
Cut 2 1"-square pieces of paper:



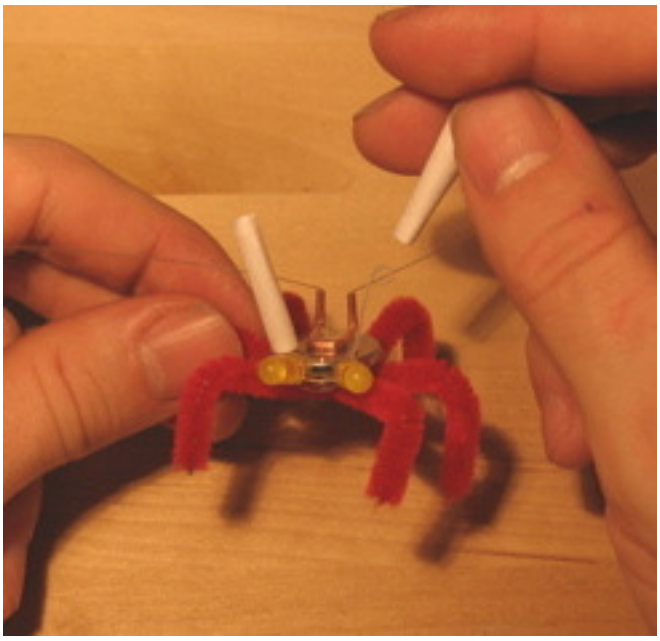
Using a bit of tape, roll them into little tubes about 3/8” in diameter:



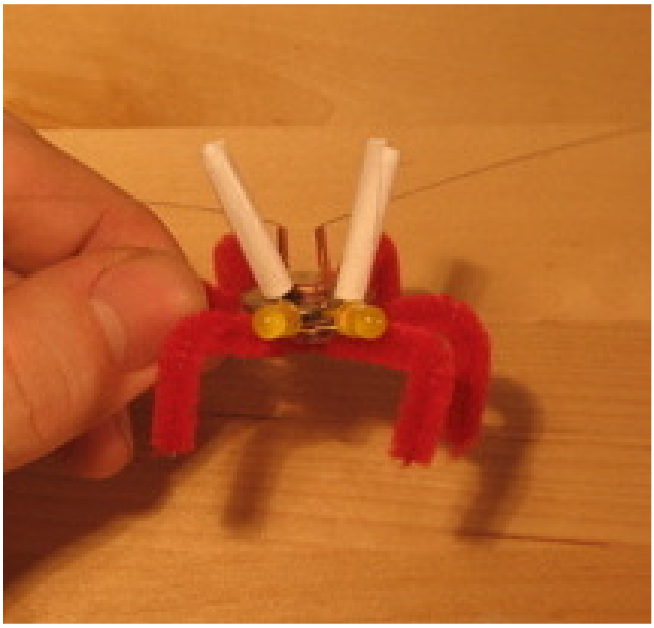
Gently pull each antenna out of its loop through the gap (opening up the gap if necessary):



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!