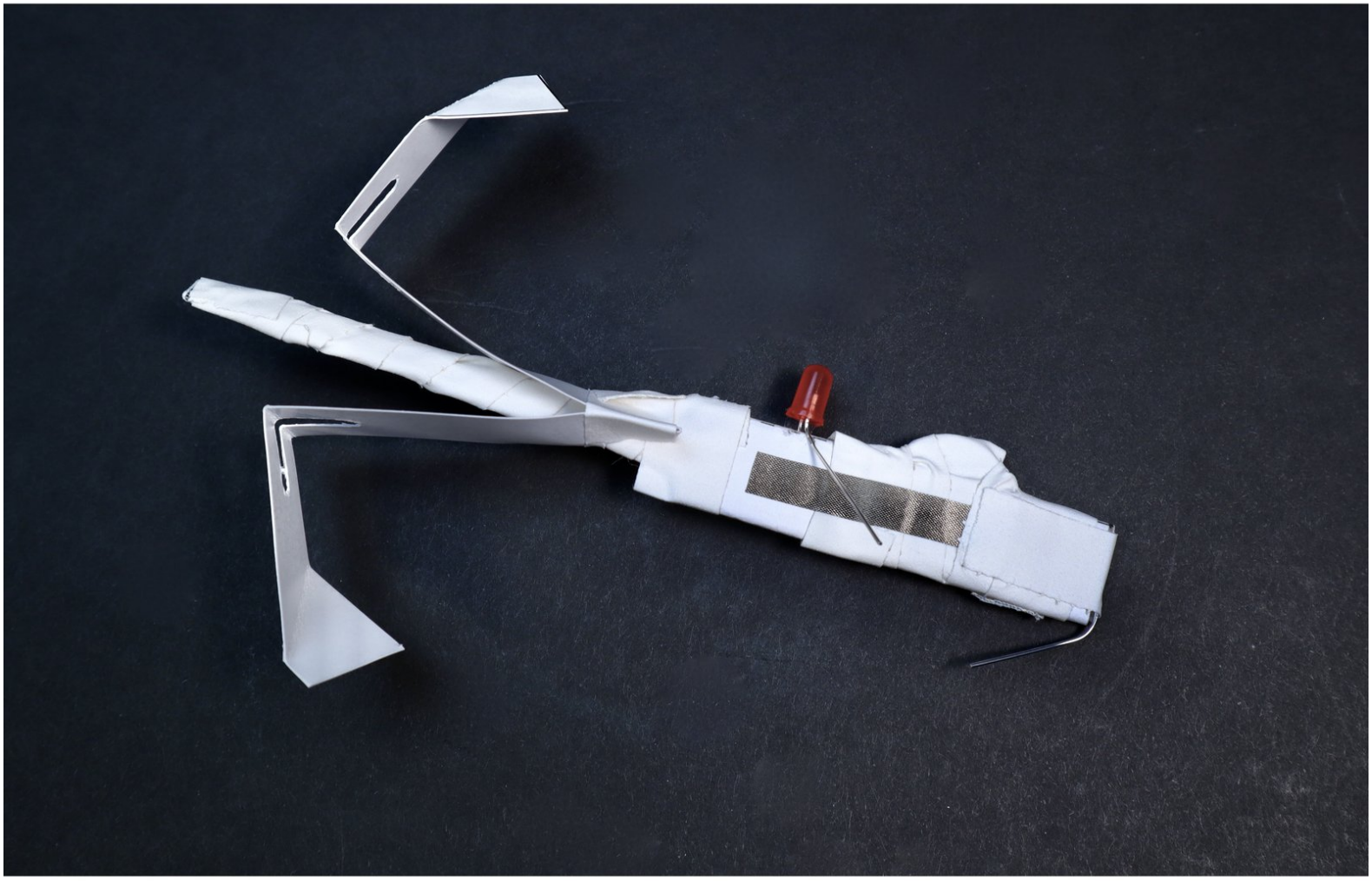
Papercraft LED Whirlybird

Use these templates and the pictured guide steps featured here to create a light-up gadget that flies and lights up!

Written By: Andy Wallus



TOOLS:

- X-ACTO Knife (1)

Used only to cut two slits for Maker Tape in the circuit and 3 slots in Rotor Blades

- Scissors (1)
- Ruler (1)

Used to measure Maker Tape and aid in folding.

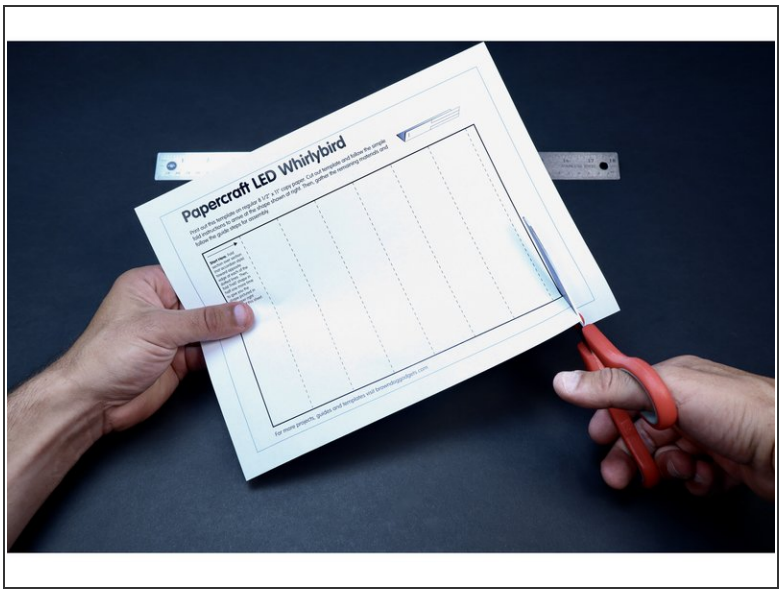
PARTS:

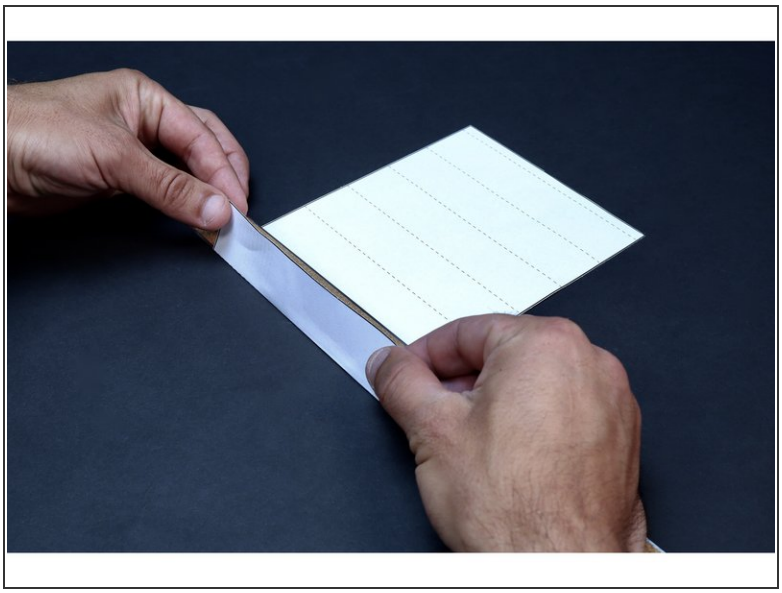
- Maker Tape (1)

1/4" Wide

- 5mm LED (1)
- CR2032 Battery (1)
- Rubber Bands (1)
- Paperclips (2)
- Duct Tape (1)
- Pencil (1)
- Printable Template (1)

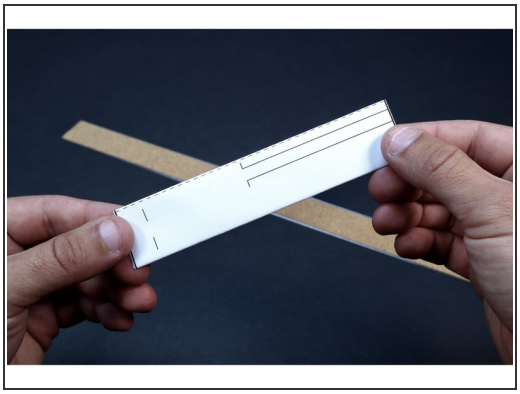
Step 1 — Papercraft LED Whirlybird



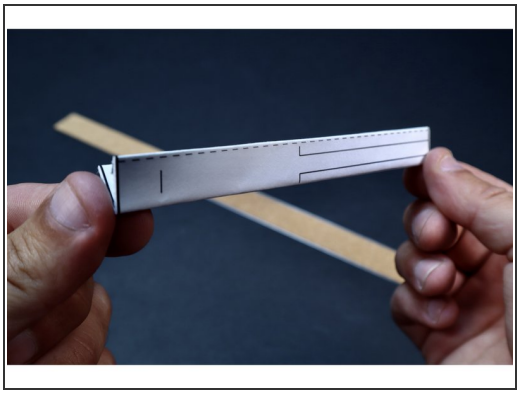


- **Print** out whirlybird template on plain copy paper. **Cut** out large, inner rectangle. Using a ruler to help make accurate folds, follow instruction on template and **fold** on dotted lines over itself 7x. This added thickness will give paper the strength to withstand launch forces.

Step 2

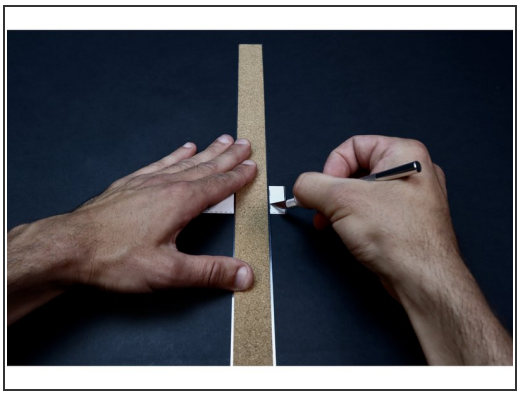
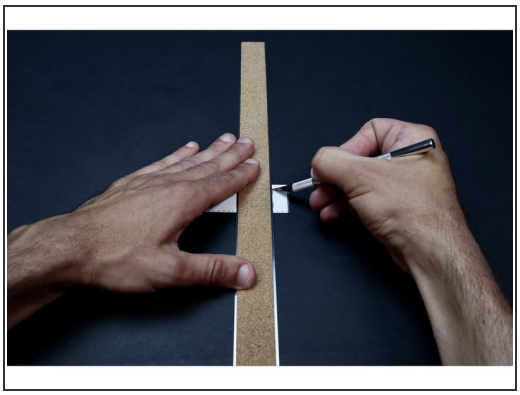






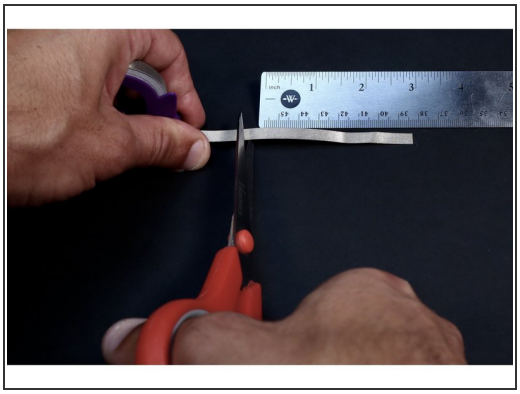
- Find the side of the shape resulting from **Step 1** which features more markings. Using a ruler and the photos at left for reference, fold this shape where shown. The final shape will be thicker and feature one side that has only one small line on it, while the other side has a **corresponding** small line AND a handful more (see final photo).

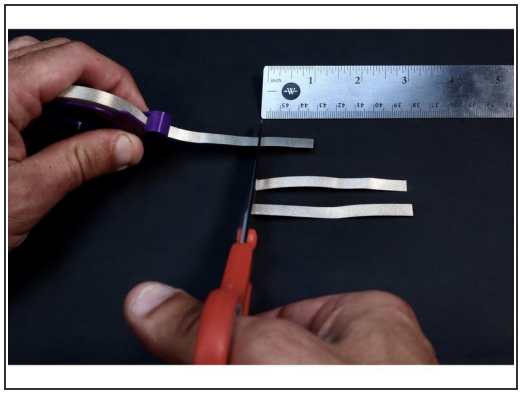
Step 3


- With proper supervision, use a ruler and an Exacto Knife to cut the **two** small **corresponding slits** shown in the photos at left. Make multiple passes with the blade and take care to only cut the length of line/slit on the template. **You will thread two small sections of Maker Tape through these slits in the coming steps.**

Step 4





- Use your ruler and scissors to **measure/cut** (2x) 3.5" sections of conductive Maker Tape followed by (1x) smaller 1.0" section.

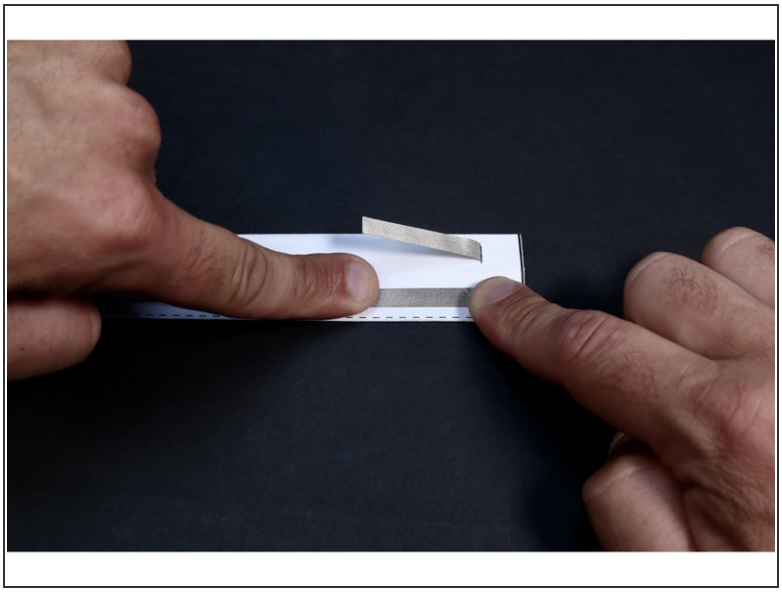
Step 5





- **Thread** each of the two 3.5" sections of Maker Tape through those slits with the sticky side facing down toward the paper. Feed them through to their approximate halfway point.
- On the side of the template **without** markings, **peel/cut** the backing back to the slit on both pieces of Maker Tape.
- **Note** that the center fold creates two "sections" of template. Press each piece of tape down the middle of its' respective section away from the slit. **DO NOT** tape near/on top of the center fold.

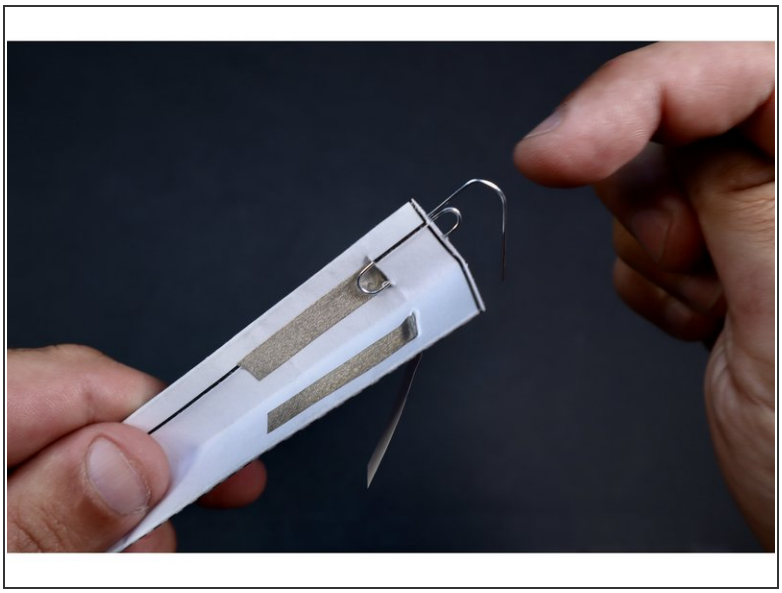
Step 6





- With the two sections of Maker Tape pressed in place on the non-marked side of this shape, flip it over and choose the section located on the side with the remaining marks to peel/cut the backing from. **Stick** it in place down the center of its' section as shown. **DO NOT** stick the other section down yet.
- **Gather** your non-conductive tape, a single paperclip and your CR2032 battery. **Prepare one length of Gaffer's or Duct Tape** by tearing or cutting it in half the long way. **Prepare the paperclip** by bending one end outward to yield the shape shown at left.

Step 7

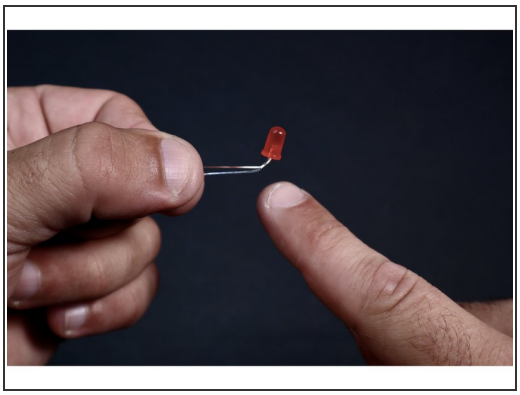
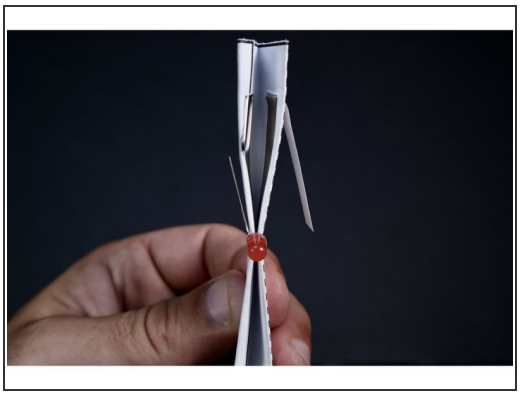




- **Seat the paperclip within the folds** as shown so that the small curly bend is threaded through the slit and the part **you** bent outward is oriented toward the center fold.
- Note: your battery will eventually be seated within the fold so that it sits between the two conductive paths you have created. On one side of the battery, there will be Maker tape and a paperclip. On the other side of the battery there will be just Maker Tape.

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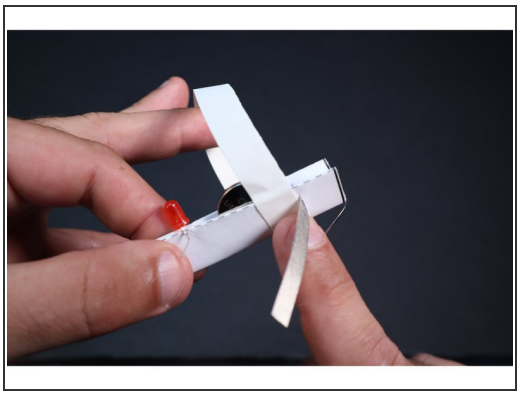
Step 8

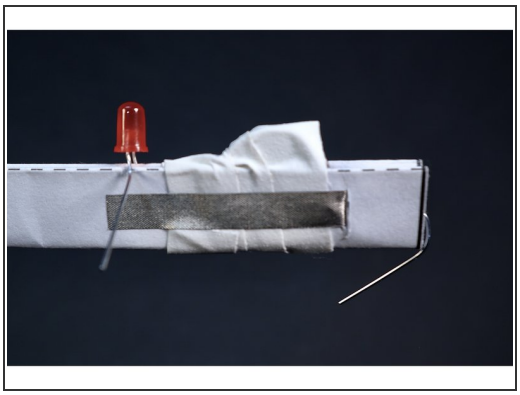




- **Find your LED and prepare it** for addition to your shape's circuit pathways by first locating the longest leg and making sure it's on the left when you hold the bulb and look at it from above. Now bend the legs away from you.
- **Seat the LED** as shown with each leg on opposite sides of the shape. These legs should be right over the area where the Maker Tape is located on the outside of the shape.
- Use the 1" long piece of Maker Tape to **tape the long LED leg** atop the nearby Maker Tape section (the only outside path that is taped down to the shape).

Step 9

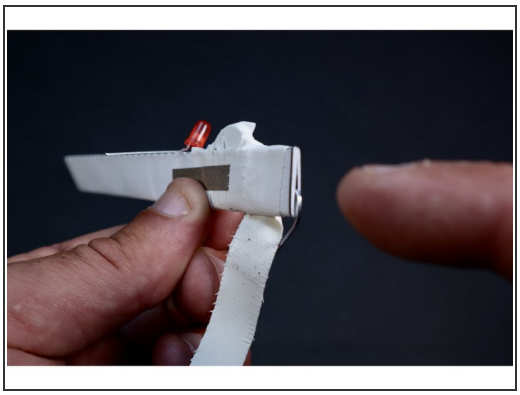
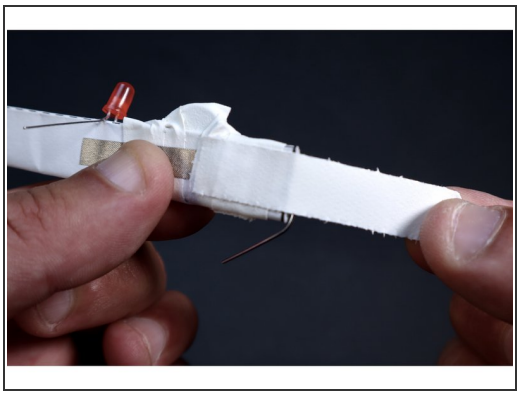






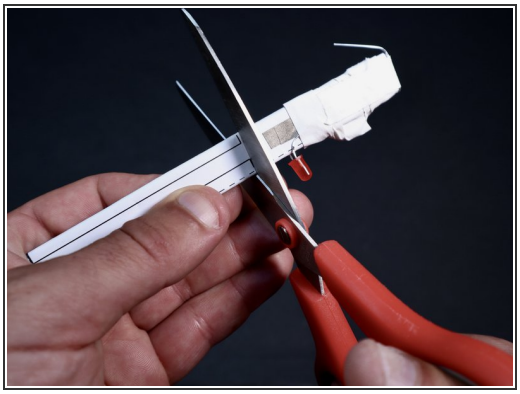
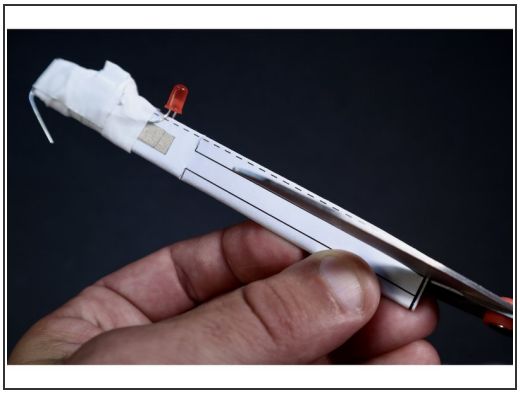
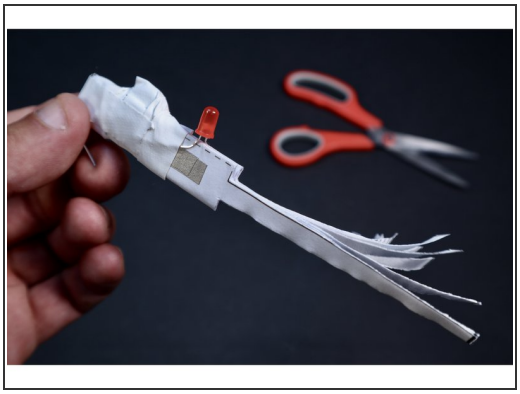
- **Seat the battery** as shown so that the positive side is facing the only remaining unsecured Maker Tape section and the negative side is facing the only LED leg currently secured.
- Pull the remaining LED leg and unsecured Maker Tape temporarily out of the way. Start a Gaffer's/Duct tape section as shown and wrap it all the way around (even over top the **secured** LED leg) to cinch the sides into contact with the now hidden battery.
- With the battery secured and held in contact with the inside Maker Tape pathways by your Gaff/Duct tape wraps, **peel/cut the backing** from that last section of Maker Tape and **stick it down** over the wraps you just finished.

Step 10

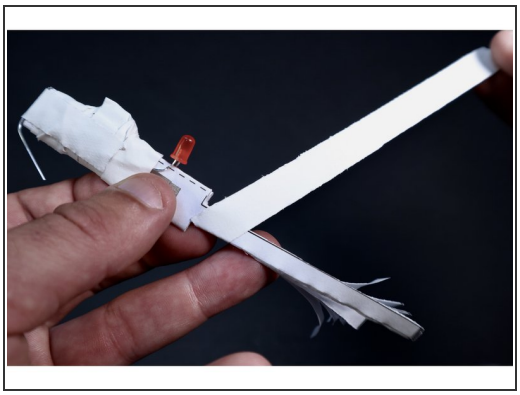
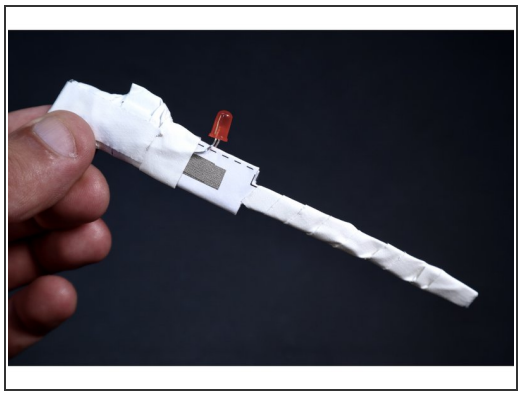
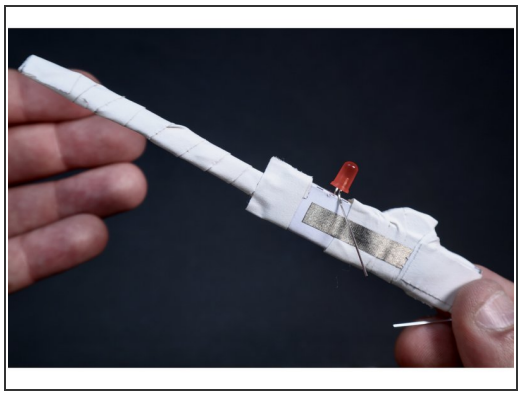

- Now, leaving that newly secured and visible Maker Tape pathway uncovered, **wrap another piece of tap**e around cleanly away from the LED toward the paperclip.
- With another small piece of gaff/duct tape, **wrap ACROSS the paperclip**. This is an important area to strengthen because this paperclip is part of the launching apparatus and will be under rubber band tension while in the process of being flung.

Step 11

- With a scissors, **carefully trim along the template lines** leaving you with a frilly, narrower section.

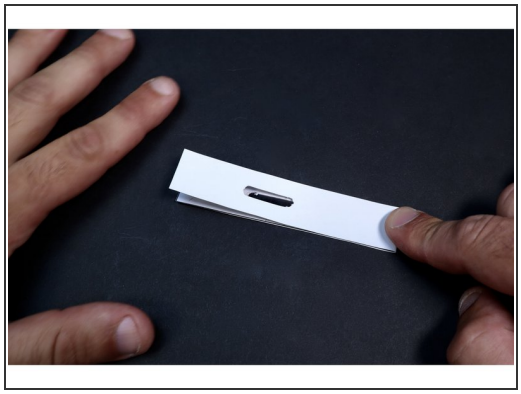
Step 12

- **Start another piece of gaff/duct tape** at an angle right where the narrow section begins. **Spiral wrap** all the way to the end, bringing all those frills together into a tidy package.
- **Wrap** a small chunk of tape around the area where the width of the shape changes to neatly reinforce.

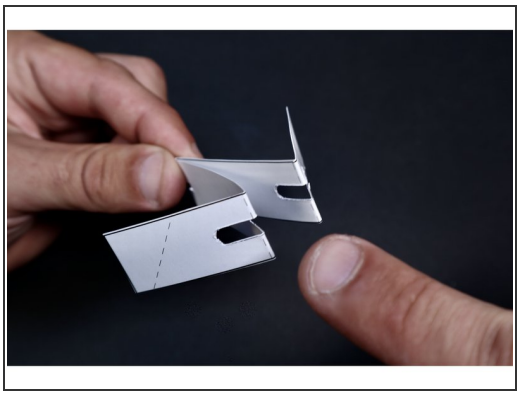
Step 13

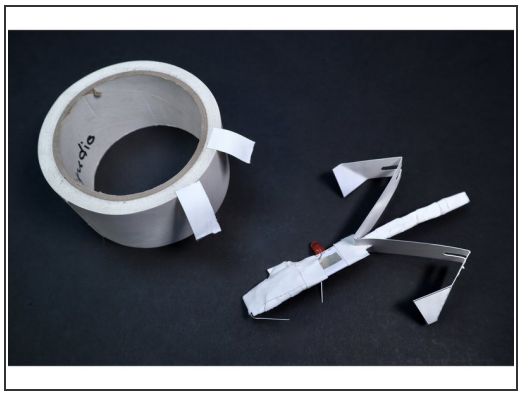




- **Print off** the Whirlybird Rotor Template on heavy cardstock. Use a scissors to **cut out one blade**. Use your **Exacto knife to remove the three slots** that are outlined on that blade.
- **Fold the shape in half** as shown on the dotted line that crosses the middle slot.

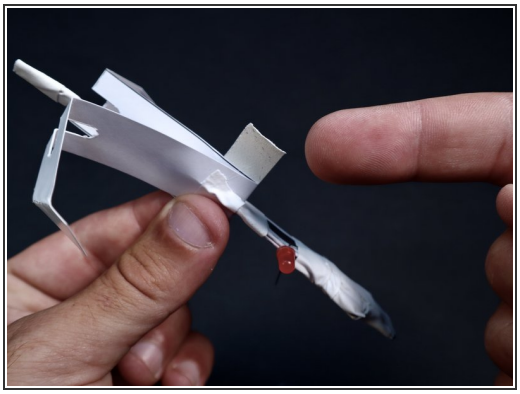
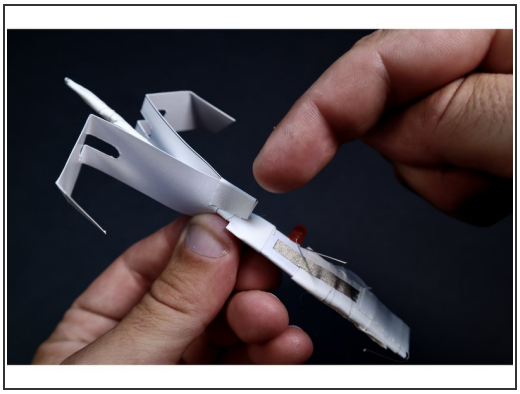
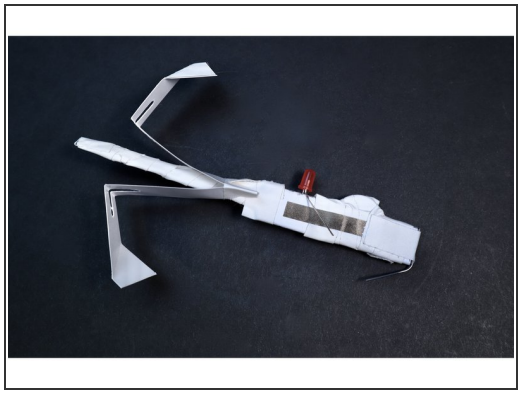
Step 14





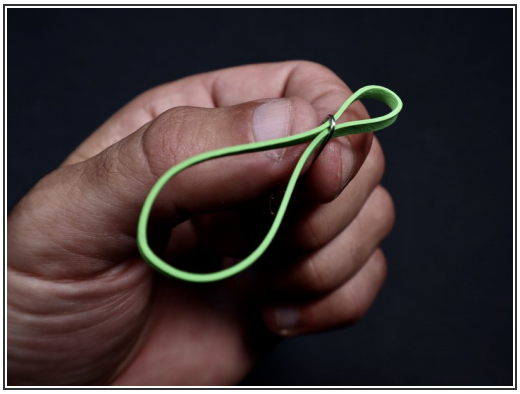
- **Fold** the next set of dotted lines that are printed across the two outer slots in the opposite direction as the first fold (as shown).
- Now **fold** at the remaining two dotted lines in the same direction. **Thread** the narrow shaft of the whirlybird body through the middle slot of the Rotor Blade to the lowest point possible.
- **Prepare** two small pieces of gaff/duct tape.

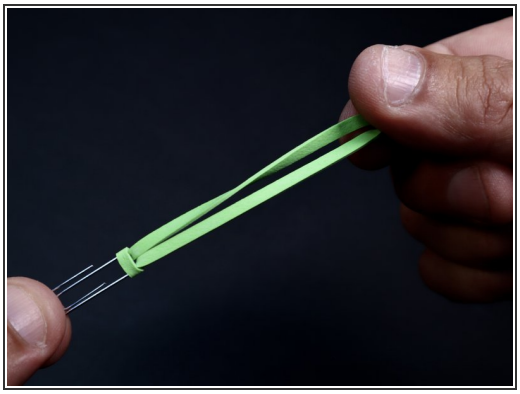
Step 15

- Use the two tape pieces to **cinch together the sides** of the Rotor Blade around the narrow shaft.

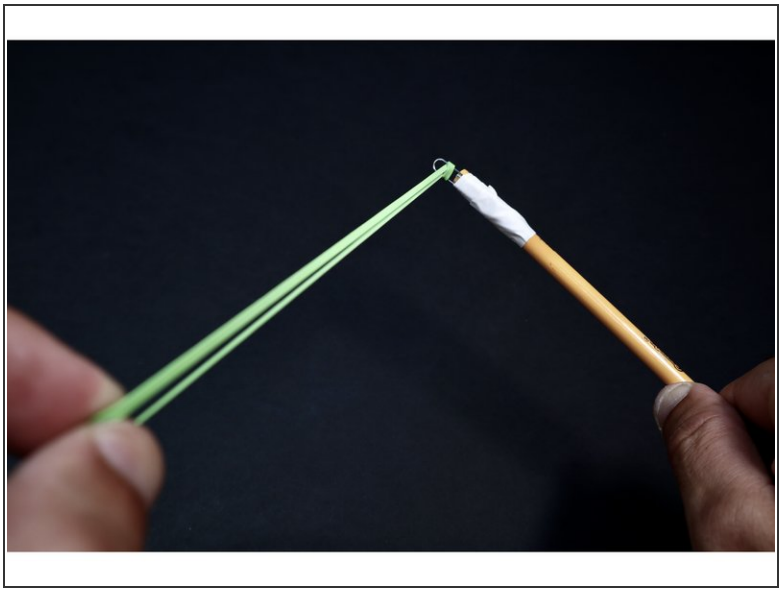
Step 16





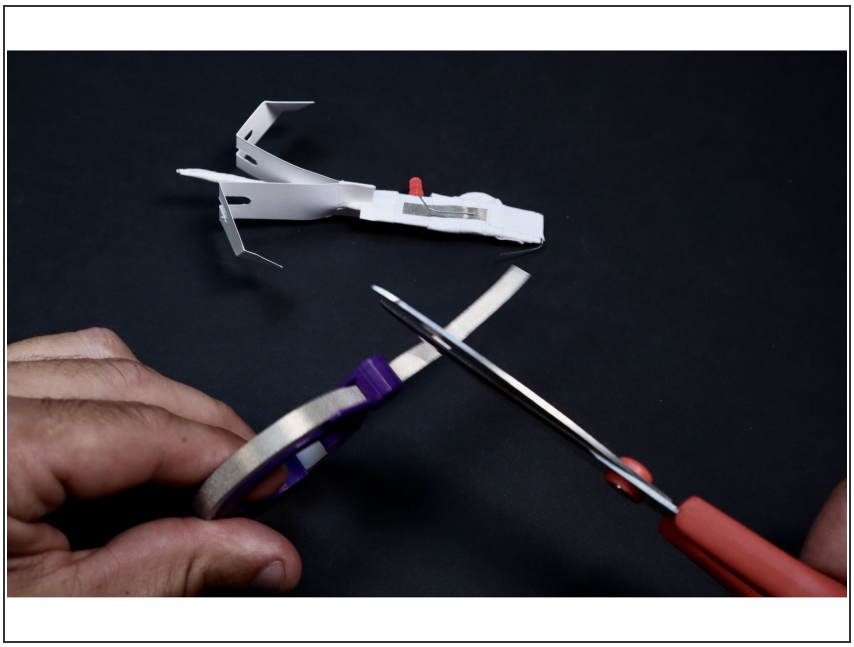
- To build the launcher, **thread your rubber band through** the remaining paperclip to form two loops as shown.
- **Grab one end** of the rubber band and, bringing it OVER the paperclip bend, **thread it through** the remaining loop.
- **Pull it tight** so it looks like the final photo.

Step 17

- **Tightly tape the paperclip** to your pencil leaving about 1/4"-1/2" hanging off the end. Tight wraps are important here because the paperclip will be under considerable tension when launching.

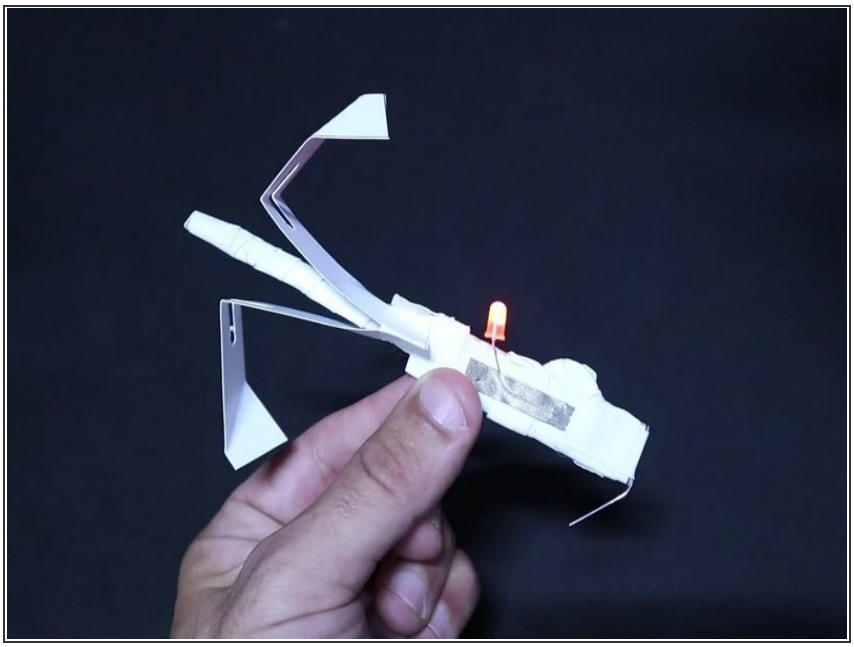
Step 18



- **To turn the LED on**, simply use a final 1" long piece of Maker Tape to tape the remaining unsecured LED leg to the remaining patch of exposed Maker Tape underneath it. **To turn it OFF**, simply peel the section off (this is how we get out of creating a switch). You are now ready for liftoff!
- **To launch**, hold the launcher in one hand. Now, place the paperclip peg from the whirlybird in the rubber band loop. Then, grab the skinny part. Pull back...aim straight up and release! It takes some practice but the whirlybird will get flung into the air and the blade will twirl as it descends.
- **Tips for better, safer flight:** 1. Wear eye protection. 2. Aim STRAIGHT UP. 3. Keep pencil hand wrist locked. 4. Make sure the rubber band isn't twisted.

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Step 19



- Insert wisdom here.

Use caution when flinging this! As with anything flung, it is wise to wear eye protection while launching this gadget. If you don't have this available, dropping it off something tall can also work (though less spinning will occur).