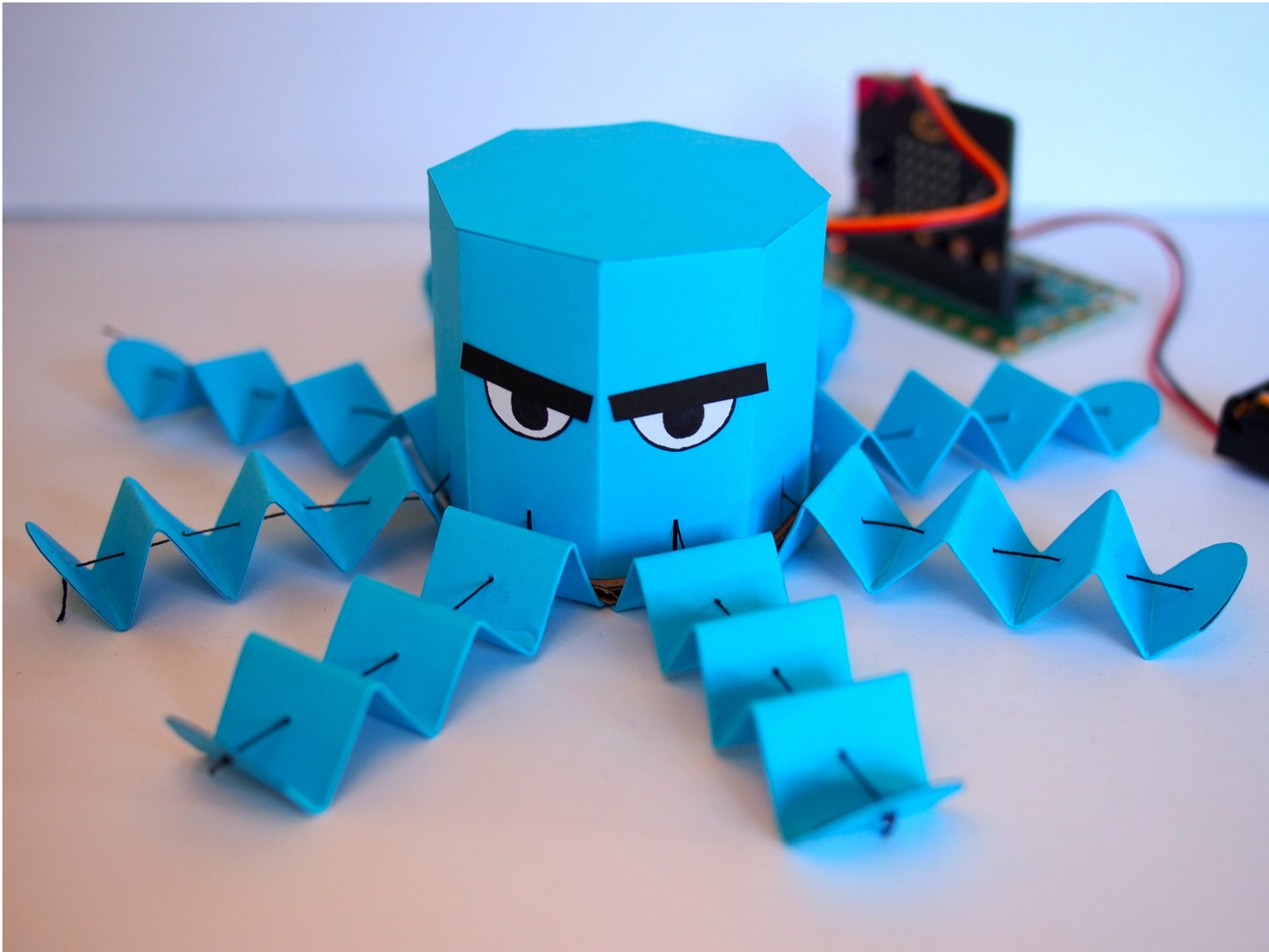




# Octobot

Make a paper octopus that retracts its tentacles.

Written By: Jasmine Florentine



# INTRODUCTION

Make a paper octopus that retracts its tentacles.



## TOOLS:

- [Glue](#) (1)
- [Sewing Needle](#) (1)
- [Scissors](#) (1)



## PARTS:

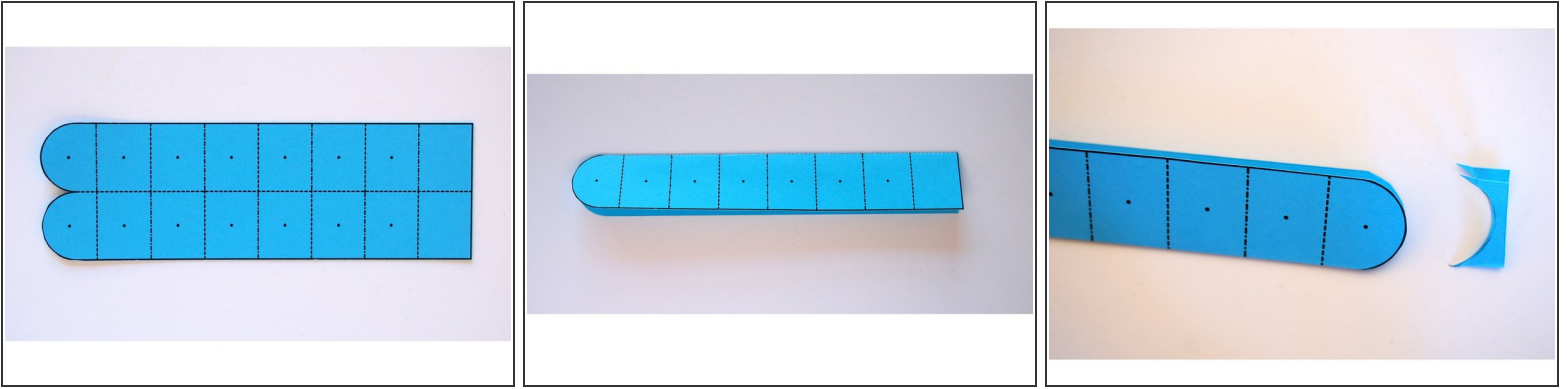
- [Crazy Circuits Bit Board](#) (1)
- [micro:bit](#) (1)
- [v2](#)
- [Brick Compatible 360 Degree Servo](#) (1)
- [2 AAA Battery Holder](#) (1)
- [Cardstock](#) (3)
- [Sewing Thread](#) (1)

*A relatively thick thread is best for durability*

- [Cardboard](#) (1)

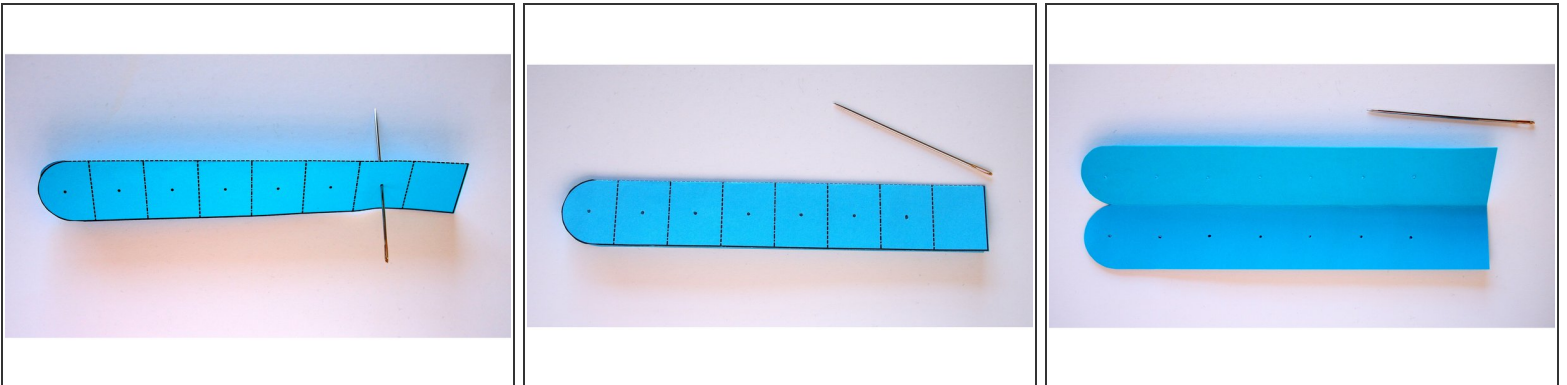
*Small piece (5" x 5" is plenty)*

## Step 1 — Making the Tentacles



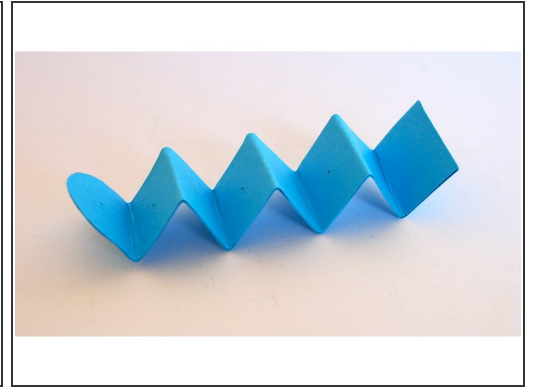
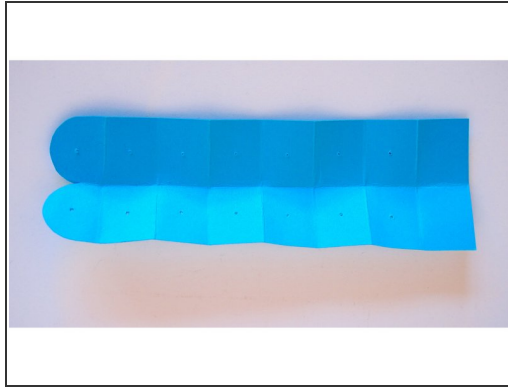
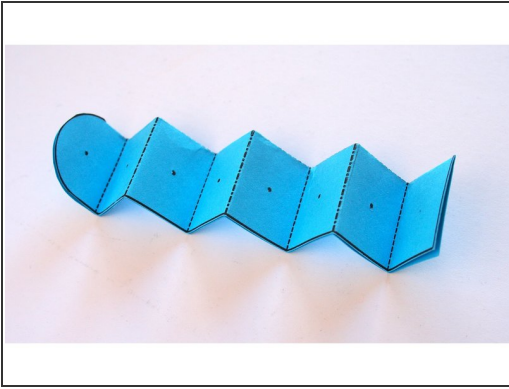
- Cut out a tentacle
  - Fold it in half with the template markings on the outside
- i** Tip: You can save some time by folding the tentacle in half, then cutting the rounded top part

## Step 2 — Poke the Holes



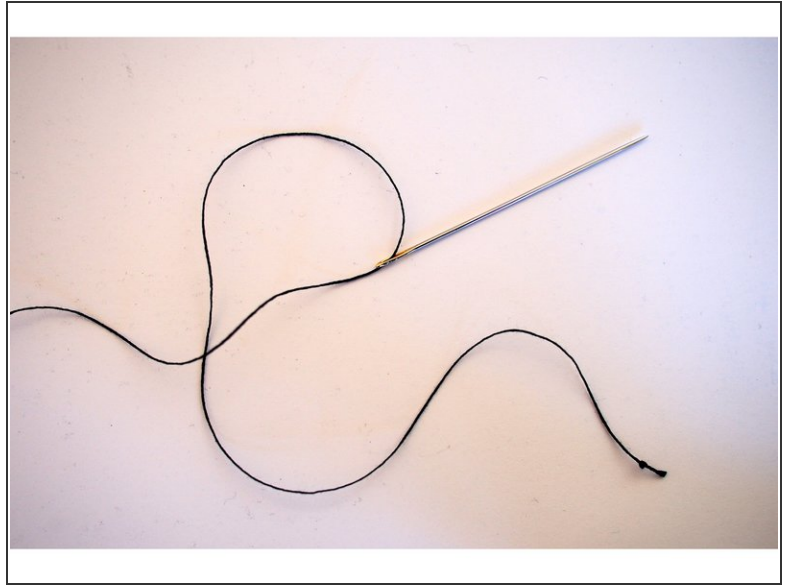
- Use a sewing needle to make the holes in the marked locations
- Make sure to go through both layers of paper

### Step 3 — Invert the Tentacle



- Fold the tentacle in a zig-zag
- Unfold the tentacle, then refold it inside out so the template markings are on the inside
  - You can also leave the template markings on the outside if that's your style!
- Optional: add glue when you fold it in half to hold the two layers together (it's not necessary since it holds its shape pretty well without glue)

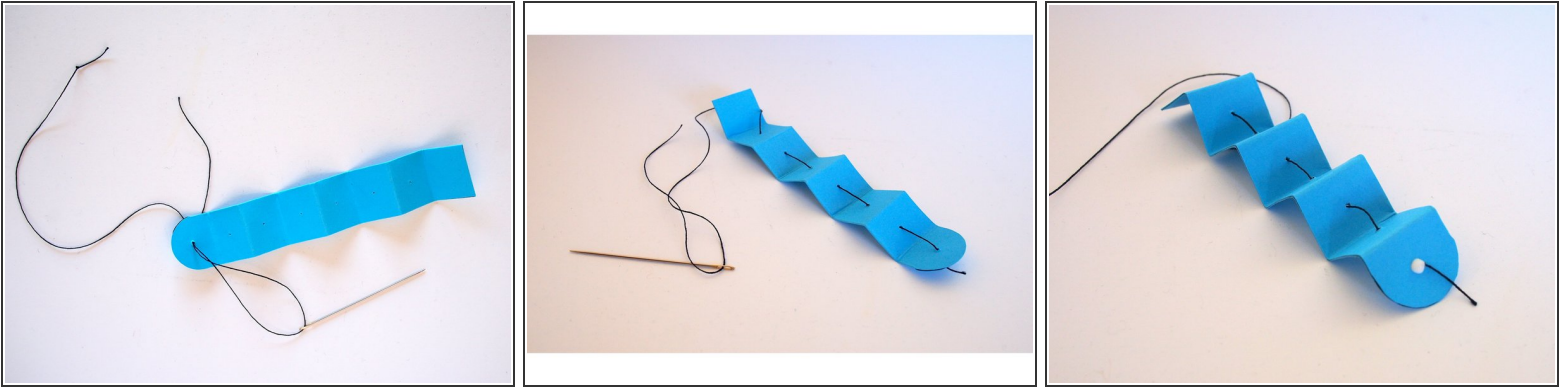
## Step 4 — Cut and Knot the Thread



- Cut a piece of thread around 12" long
- Double or triple knot the end of the thread
- Thread the needle

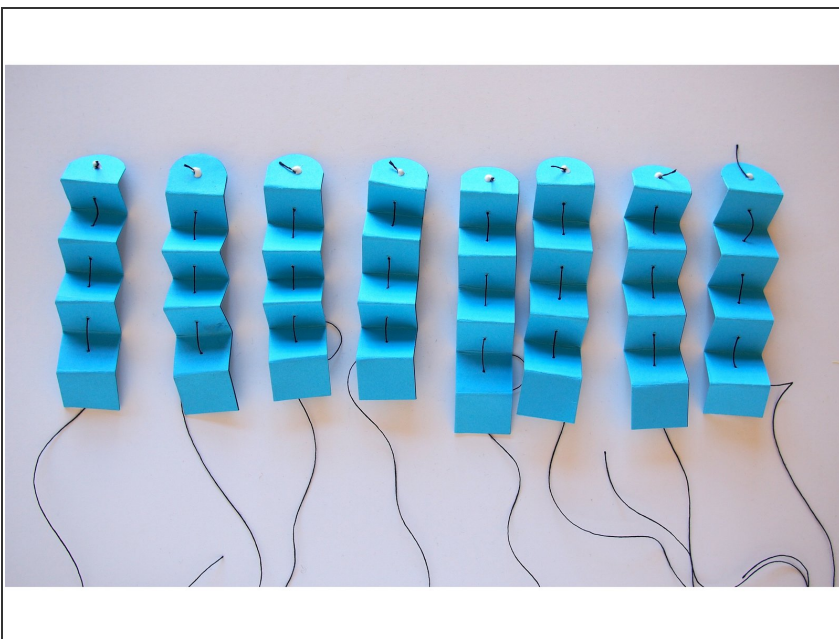


## Step 5 — Sew the Tentacle



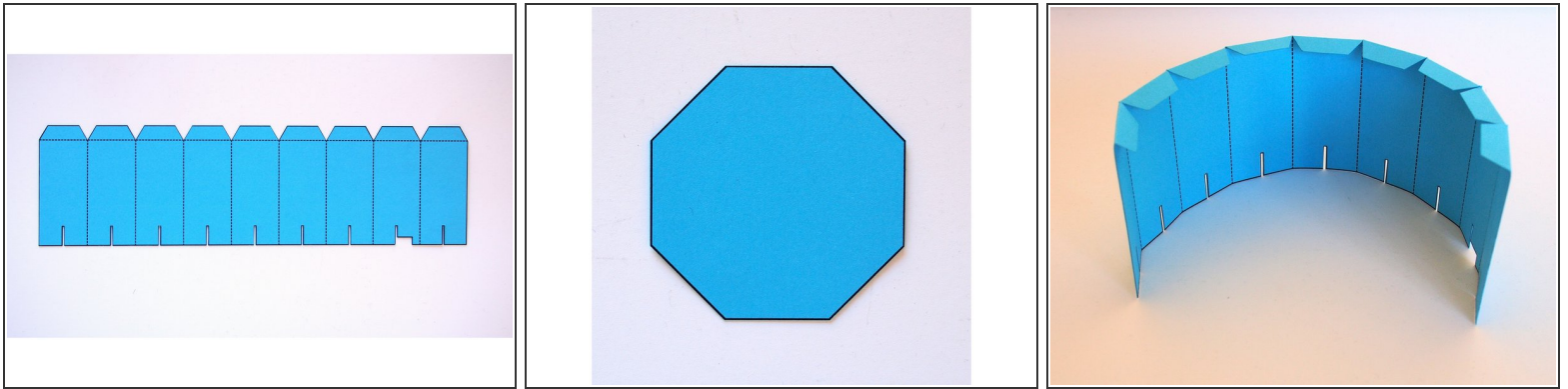
- Use the holes you made in step 2 to sew the thread through the tentacle
  - Make sure to start from the rounded end of the tentacle, and on the outside of the zig-zag fold
  - Add a drop of glue (or tape) on the knot to make sure it doesn't pull through the paper
- i** Double check that the knotted end is on the rounded side of the tentacle, and the extra thread is on the opposite side

## Step 6 — Make More Tentacles!



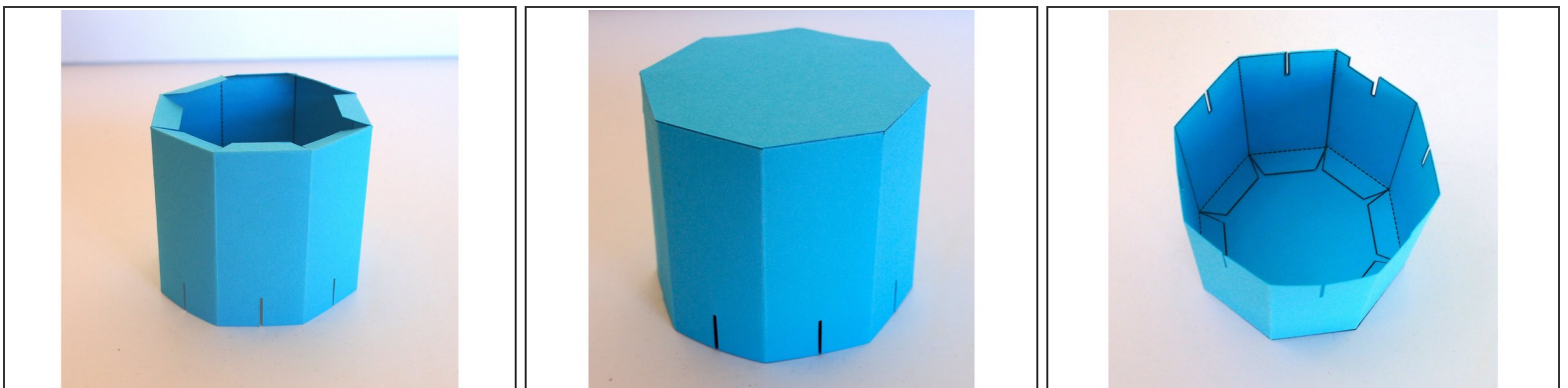
- Repeat 7 more times until all 8 tentacles are finished
- Set the legs aside for now to let the glue dry
- Are you regretting making a robot with 8 legs? Just be glad it's not a centipede!

## Step 7 — Making the Body



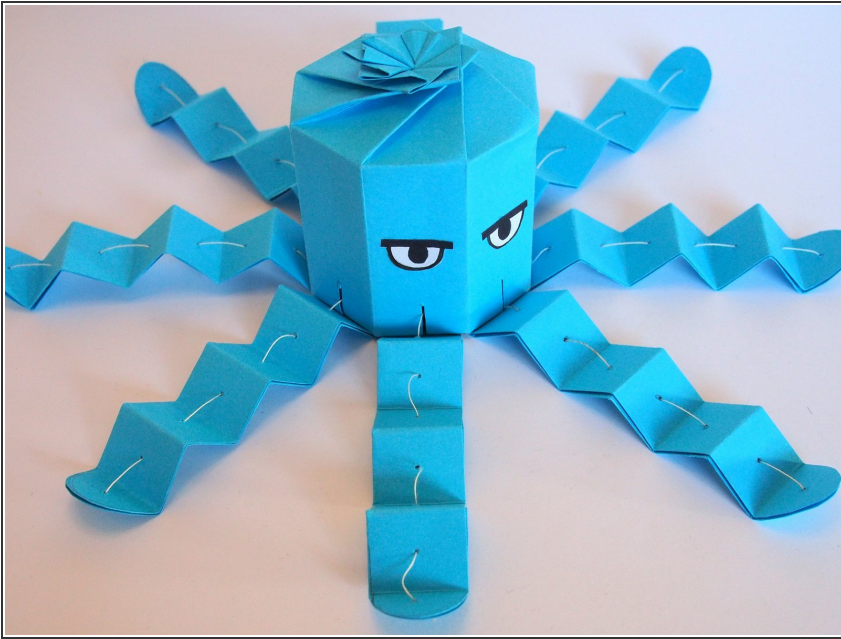
- Cut out the template for the body and top
- Fold the body following the markings on the template

## Step 8 — Assemble the Top and Body



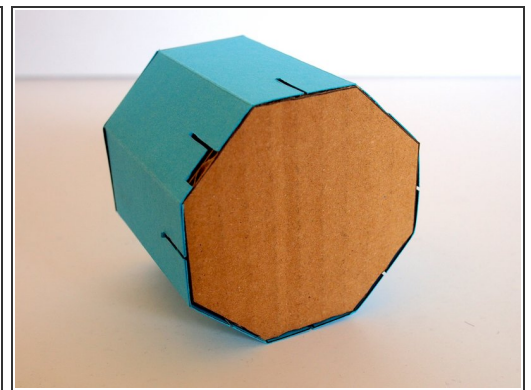
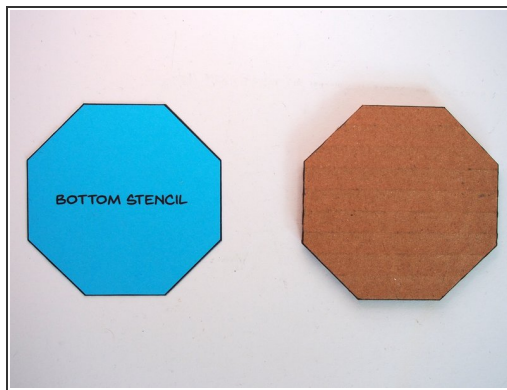
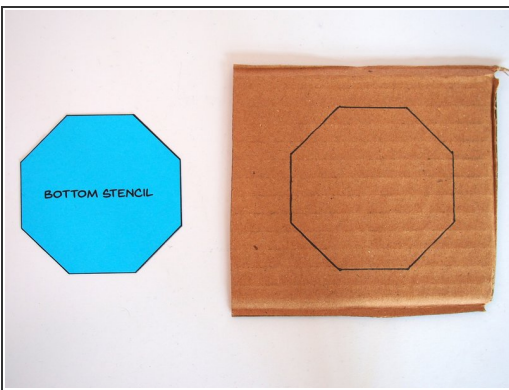
- Glue the body into an octagon shape (the two sections on either end should overlap on top of each other to form 8 sides)
  - Glue the top on to the tabs
- i** Tip: I found it easiest to flip the body upside down while I was gluing the tabs in place

## Step 9 — Alternative Body



- If you're feeling up to a challenge, you can also make the body using the origami method, which results in the twisty-top on this Octobot
- I used the instructions here to create an Origami Octagonal Box: [Origami Octagonal Box](#)

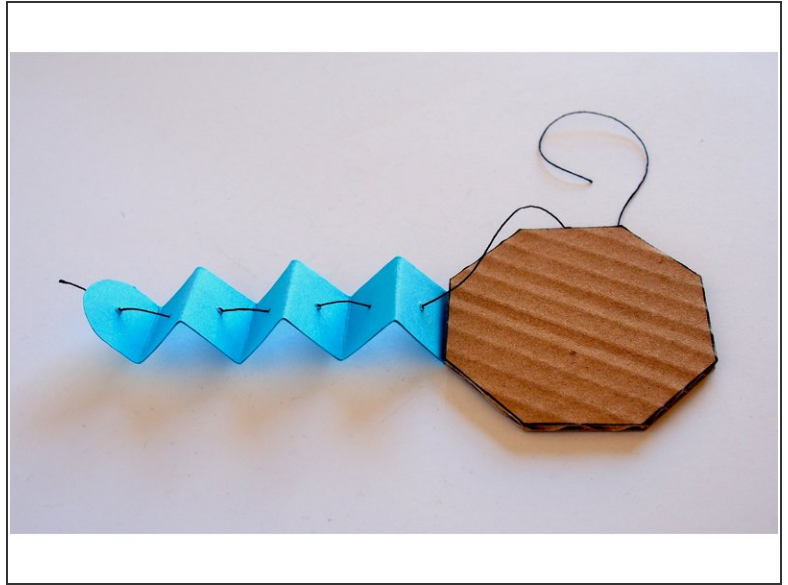
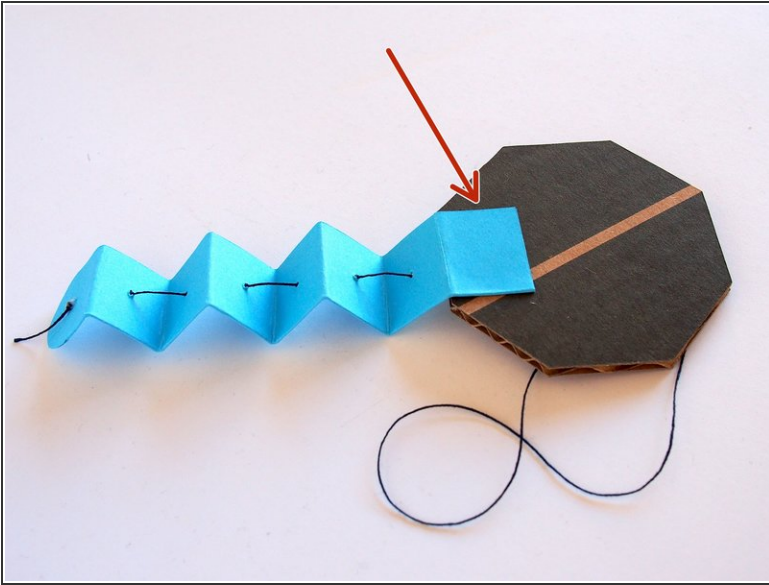
## Step 10 — Cut the Base



- Use the base stencil octagon to trace an octagon onto a piece of cardboard
- Cut the base octagon out of cardboard
- The base should be just small enough to fit inside the body (but not so small that there's loads of empty space around it)



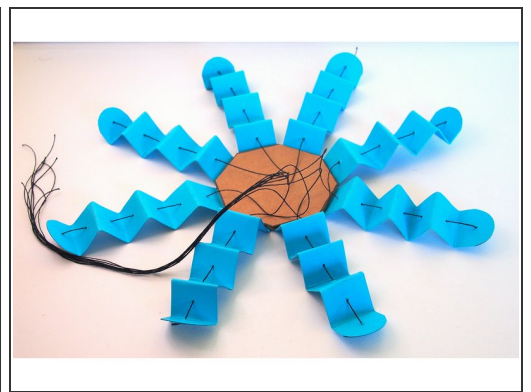
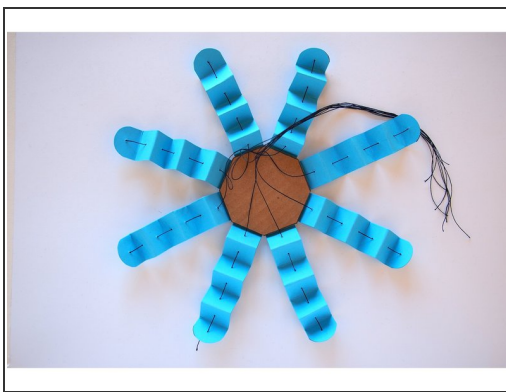
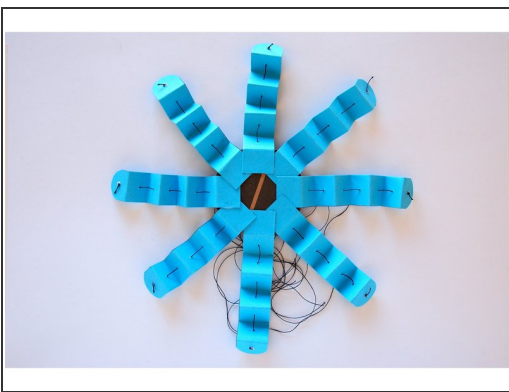
## Step 11 — Attach the Tentacles



- Glue a tentacle to the bottom of the cardboard base
- Only glue the last folded section of the tentacle (the one without a hole)

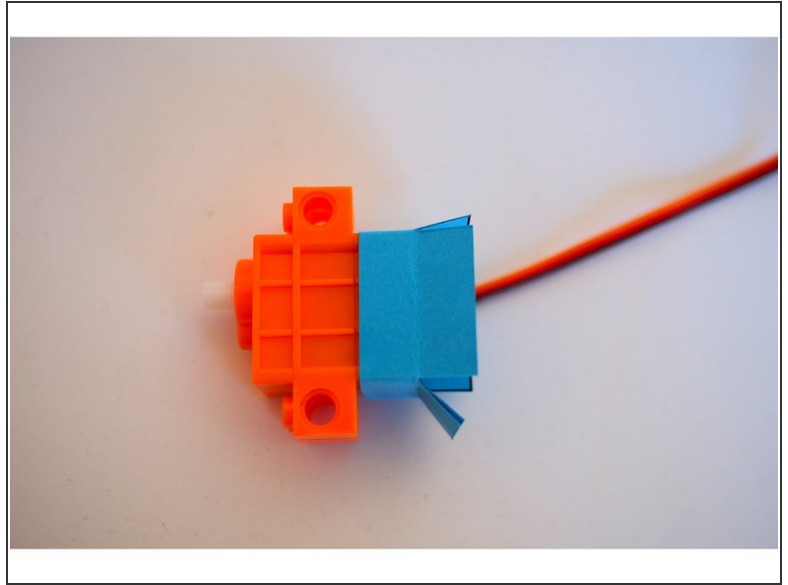
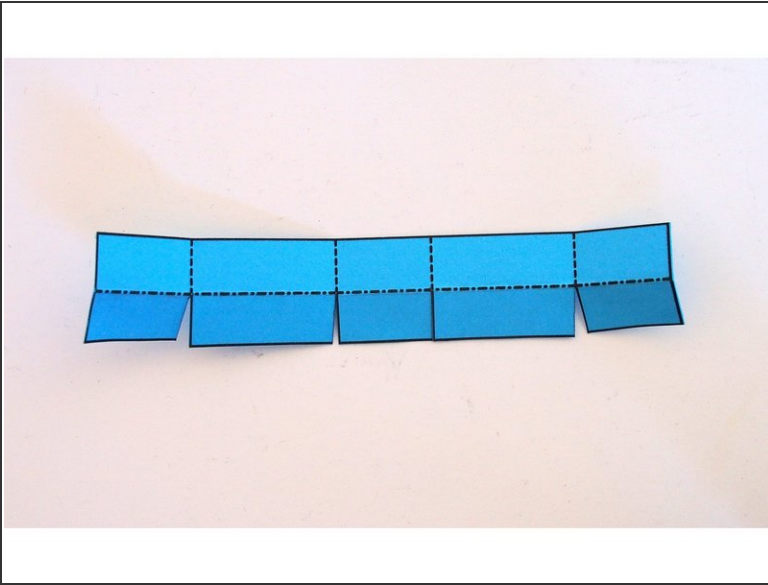
⚠ Make sure the thread doesn't accidentally get glued to the cardboard

## Step 12 — Add the Other Tentacles



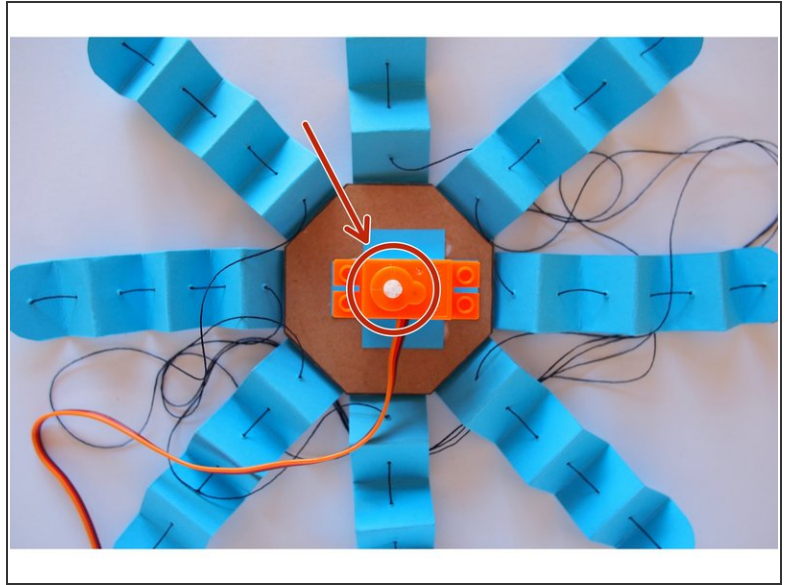
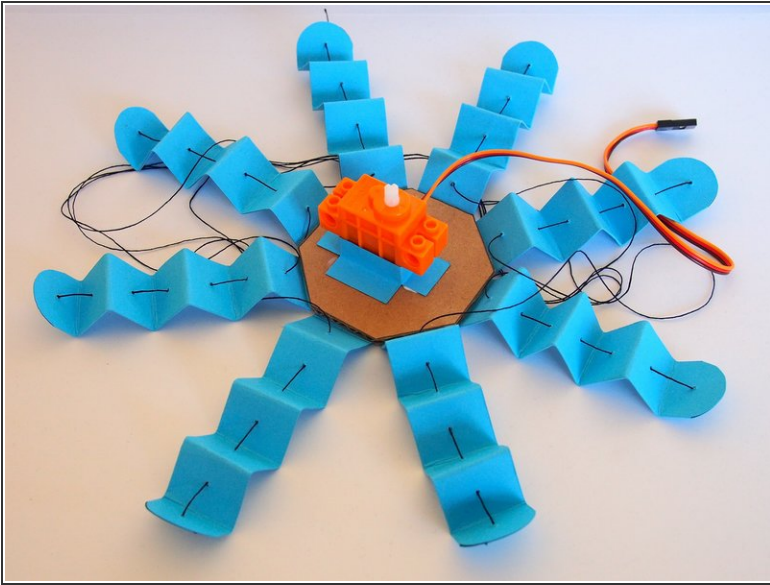
- Repeat for the other 7 tentacles
- Try to keep the threads from getting tangled

## Step 13 — Make the Servo Holder



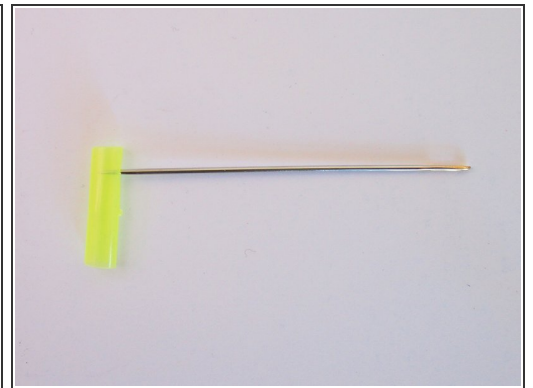
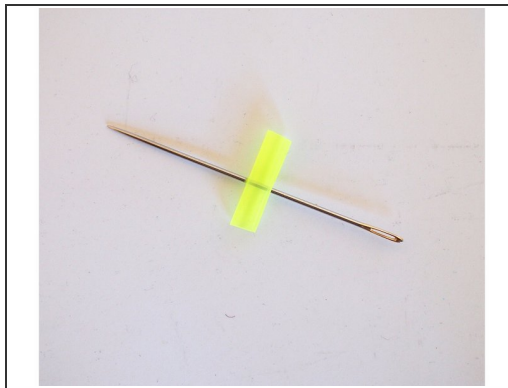
- Cut the servo holder template
  - Fold the servo holder
  - Glue it around the servo
- i** You don't need to glue the paper to the servo—just wrap the servo holder around the servo, and glue it where the two parts overlap

## Step 14 — Attach the Servo



- Glue the servo holder to the cardboard base of the Octobot
- ❗ Note that the servo itself isn't centered on the body—the servo's *shaft* is what should be approximately centered

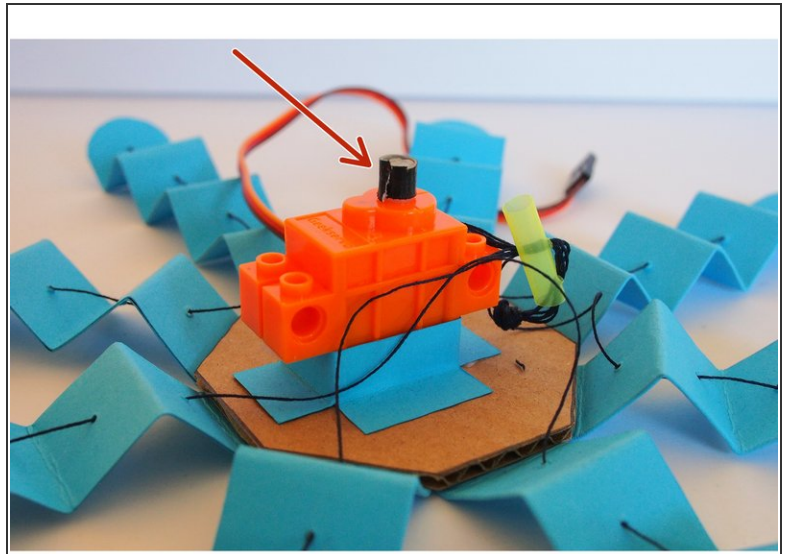
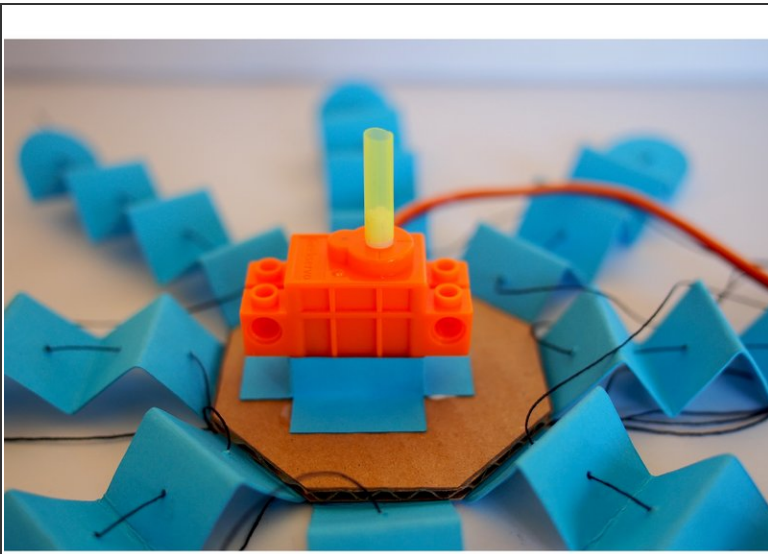
## Step 15 — Making the Axle



- Cut a piece of straw about 3/4" long
- Use the needle to poke a hole through the straw at about halfway between the top and bottom
- Poke another hole (this one only needs to go through one wall) close to the top of the piece of straw



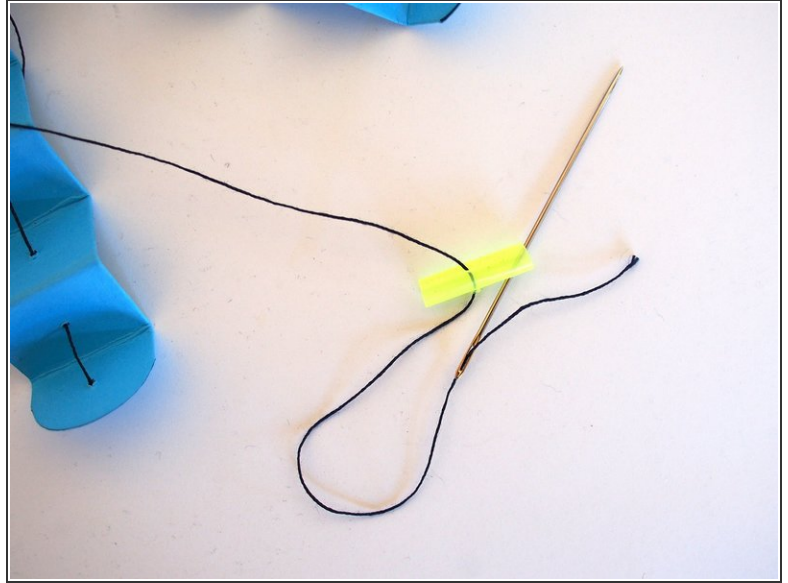
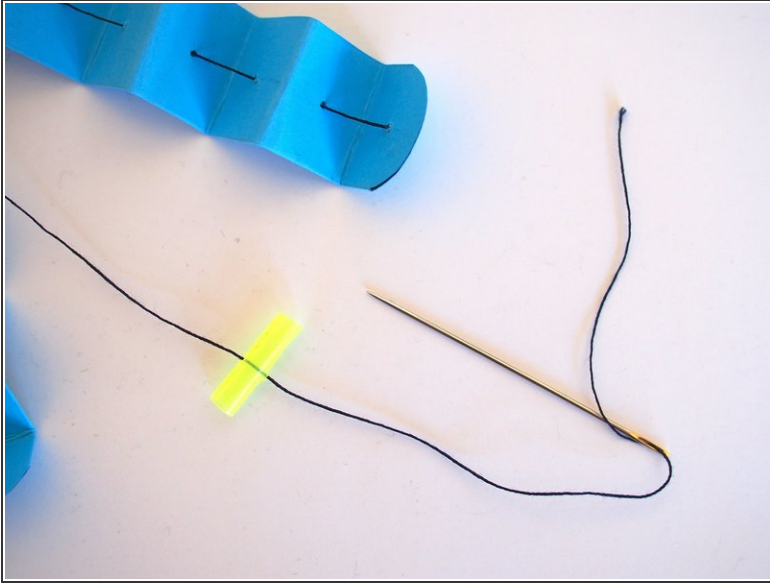
## Step 16 — Check the Straw Size



- Put the straw onto the servo shaft
- Since straws come in all different sizes, it may be too big. If that's the case, put a very small piece of tape around the servo shaft to increase its diameter
- The straw should fit snugly on the shaft

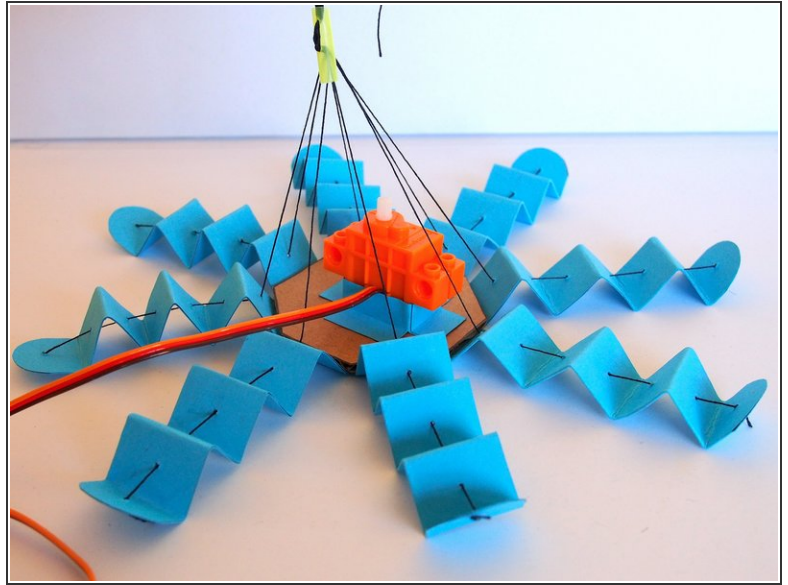
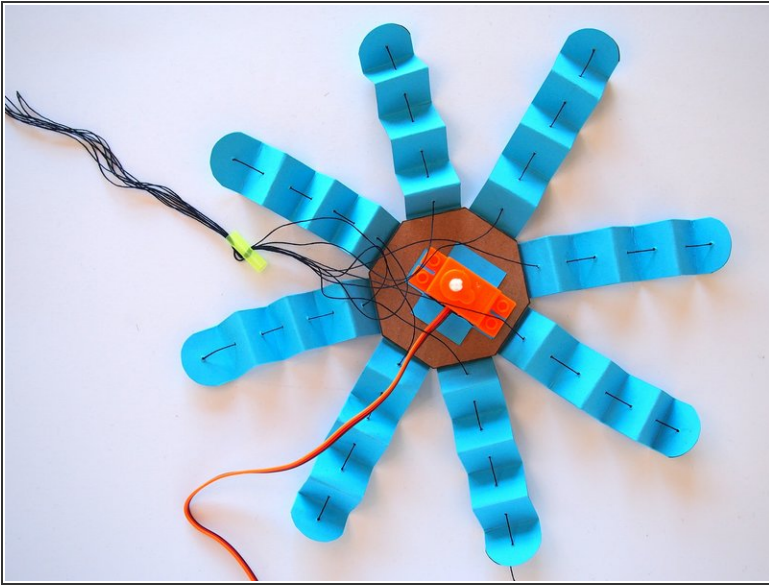


## Step 17 — Attach the Thread



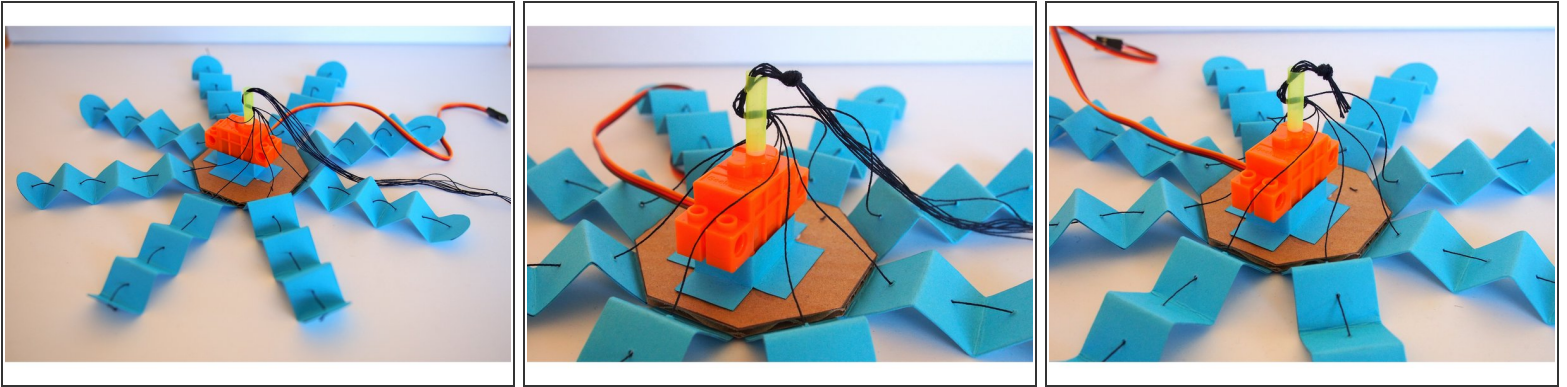
- Sew one of the pieces of thread onto the straw
- First go through the middle holes, then up out the top

## Step 18 — Do It Again



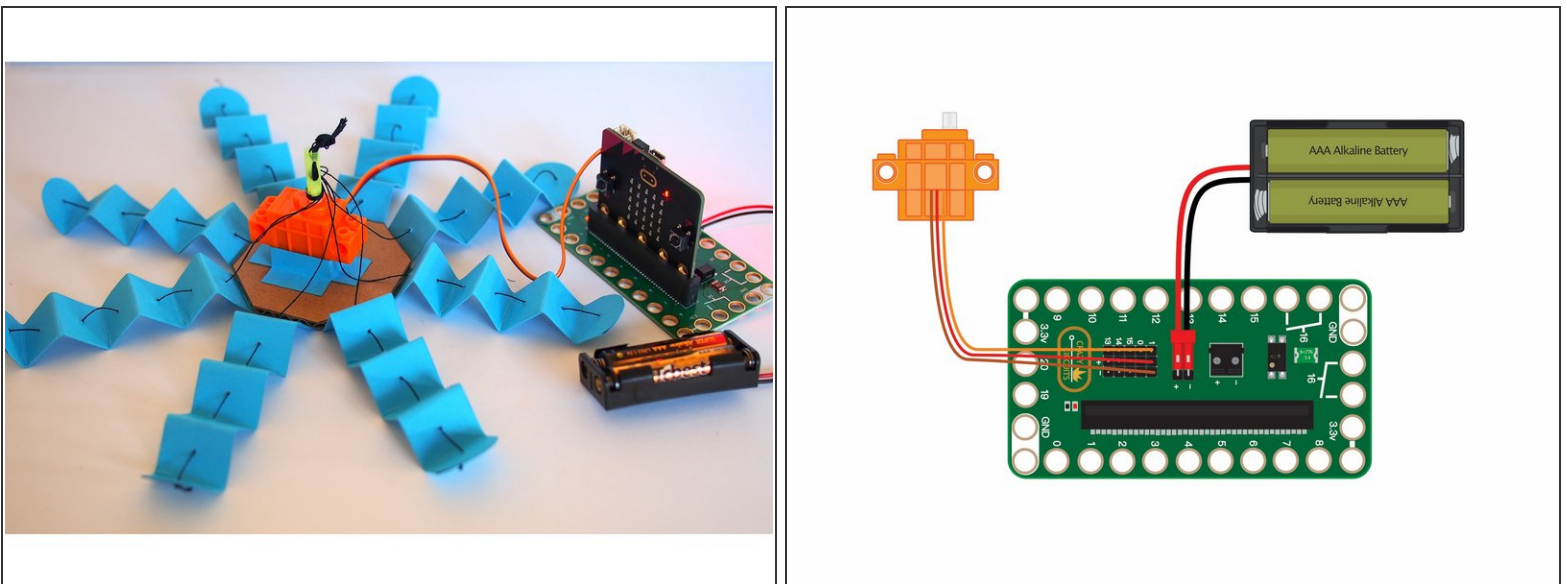
- Repeat this 7 more times until all 8 pieces of thread are sewn into the straw
  - ❗ It's best to do this one piece of thread at a time to avoid them getting tangled or twisted
- Check that the length of the thread between the straw and the tentacles is roughly the same
  - You can check this by pulling the piece of straw up to check that the threads are all roughly the same tensions

## Step 19 — Attach the Axle



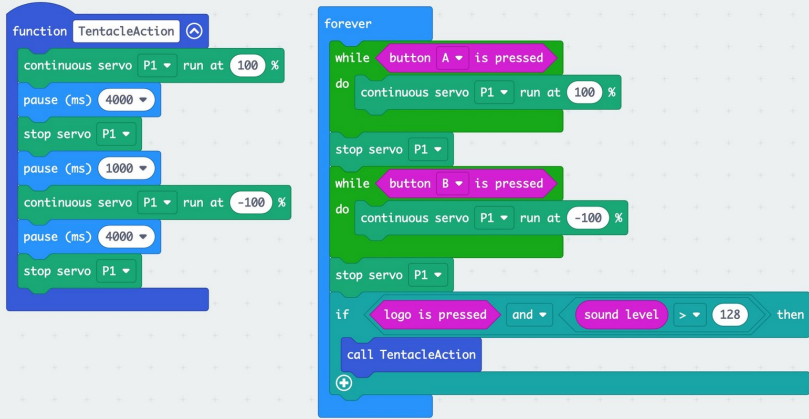
- Push the straw to the servo shaft, making sure it's snug (if it's loose, the shaft will just spin inside the straw without turning the straw itself)
- Make sure the tentacle are all fully extended, then tie a big knot where the threads exit from the straw
- Trim the extra thread

## Step 20 — Connect the Circuit



- Connect the servo to the Bit Board at Servo Pin 1

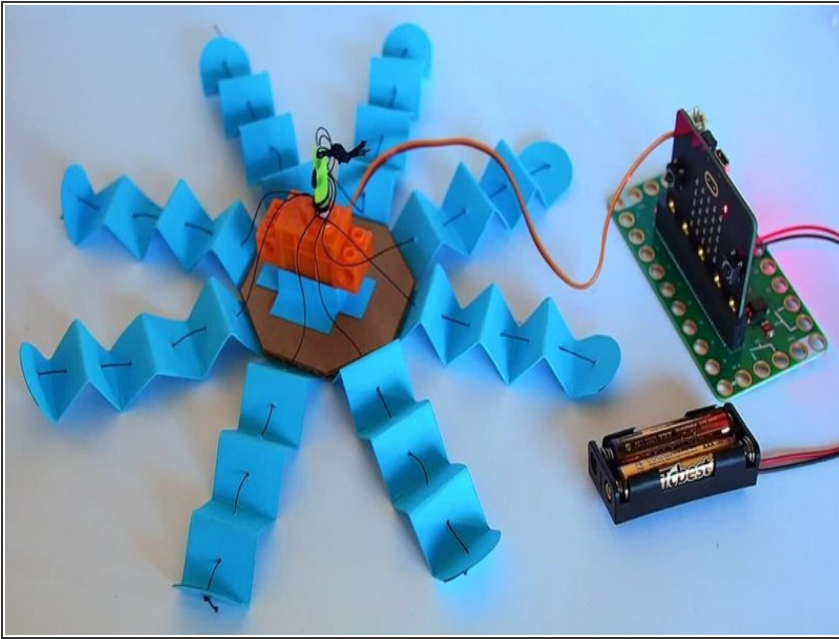
## Step 21 — Upload the Code



- Upload the code from here: [Octobot Code](#)
- You'll note that the sound activation requires touching the logo at the same time. That's to avoid accidentally triggering it if you're in a noisy environment. You can change that by getting rid of the "logo is pressed" block
- ❗ The sound trigger requires using the micro:bit v2. If you don't have the v2, there's loads of other ways you can trigger the Octobot, such as using the accelerometer to shake the micro:bit, or making it light-sensitive

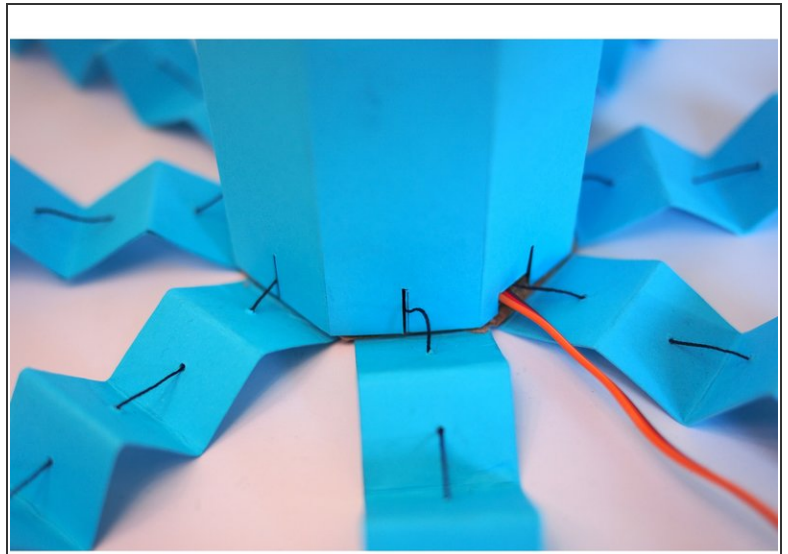
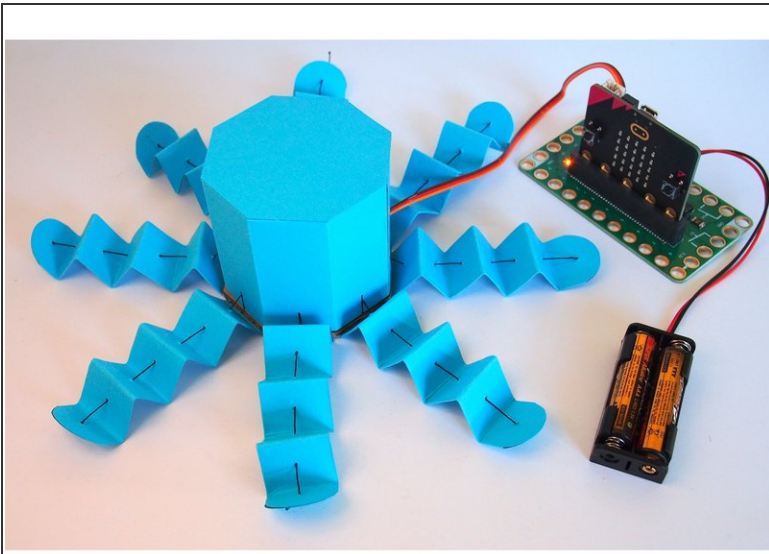


## Step 22 — Test It



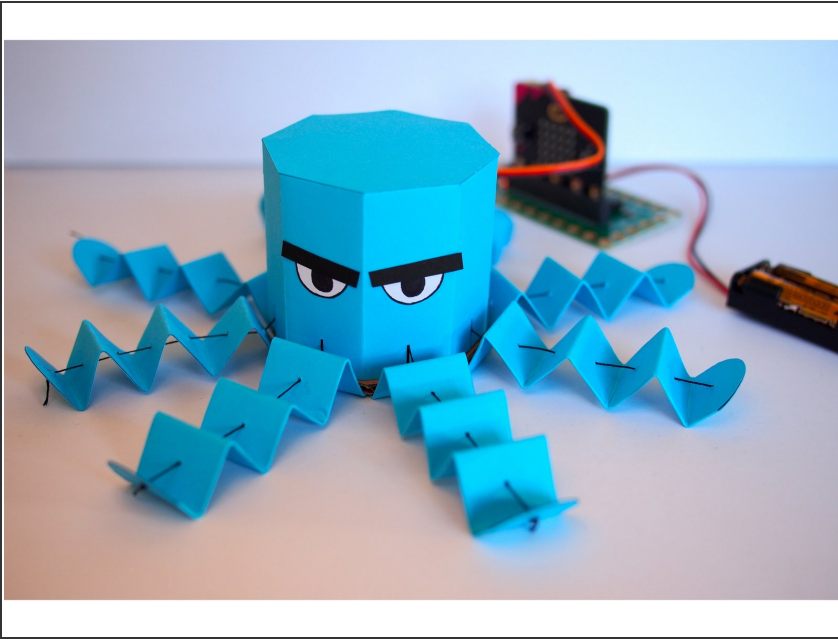
- It's easiest to test the mechanism while the servo is still exposed
- Use the A and B buttons to try retracting and extending the tentacles
- Tip: For the TentacleAction function, try playing around with the timing and speed to get different effects
- Depending on how loose the threads are, you may need to pre-wind the threads around the axle by using the A button before triggering the TentacleAction function

## Step 23 — Put the Body On



- Put the body on
  - The thread should slide into the thin cutouts in the body
  - The servo wire should go through the larger cutout
- Optional: You can add a bit of glue to secure the body to the cardboard base (I didn't in case I wanted to access the inside)

## Step 24 — Give it a Face



- Give your Octobot a face!
- Touch the logo and shout "BOO!" to make Octobot retract its tentacles!