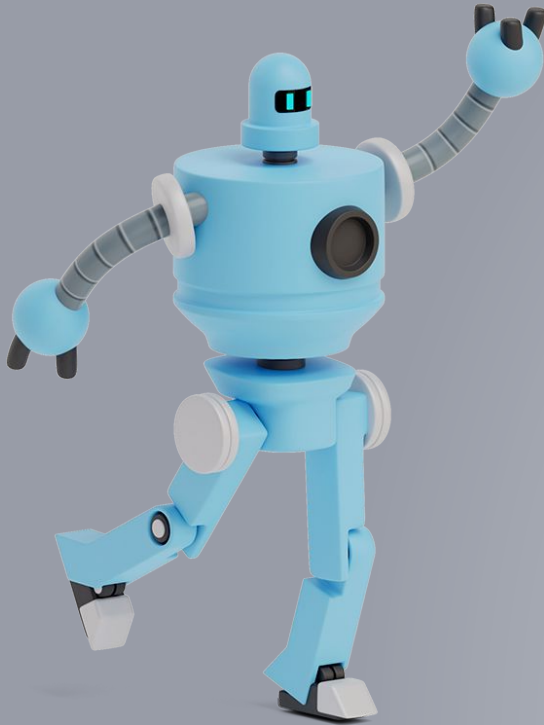


WEEK 4: ROBOTIC ARM WORKSHOP



MATERIALS



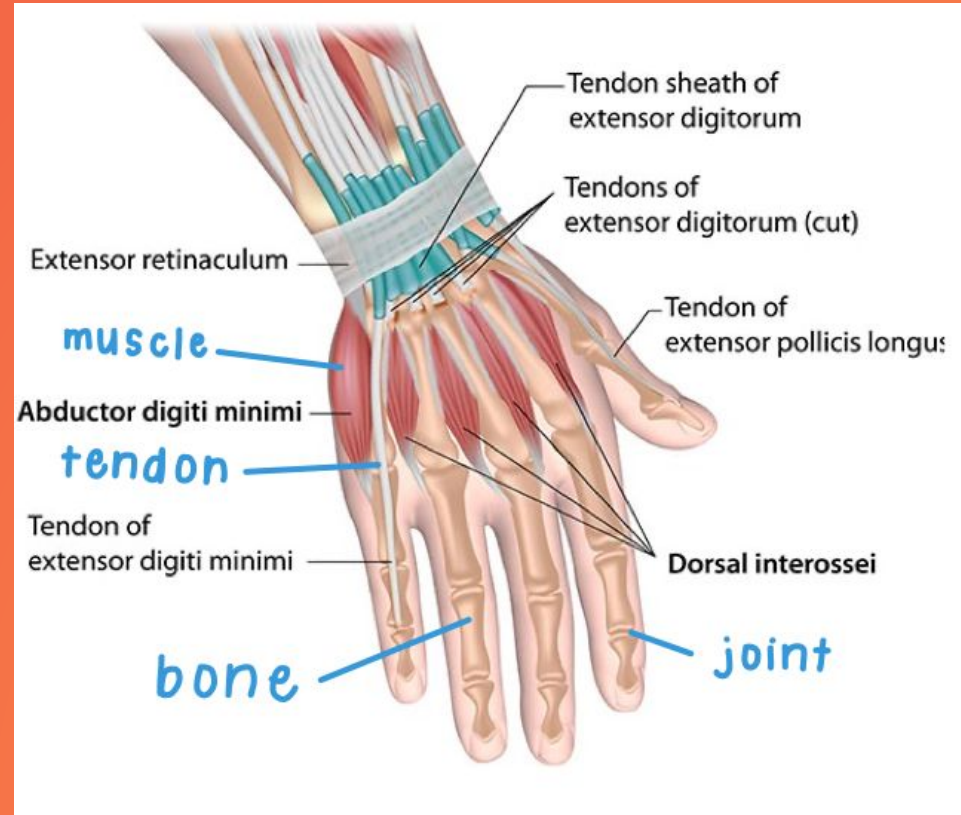
ANATOMY OF A HAND

Bone: the substance that forms the skeleton of the body

Muscle: allow a person to move their body and enable the internal organs to function

Tendon: fibrous connective tissue which attaches muscle to bone

Joint: the part of the body where two or more bones meet to allow movement



★ ★ DESIGN YOUR HAND! ★ ★

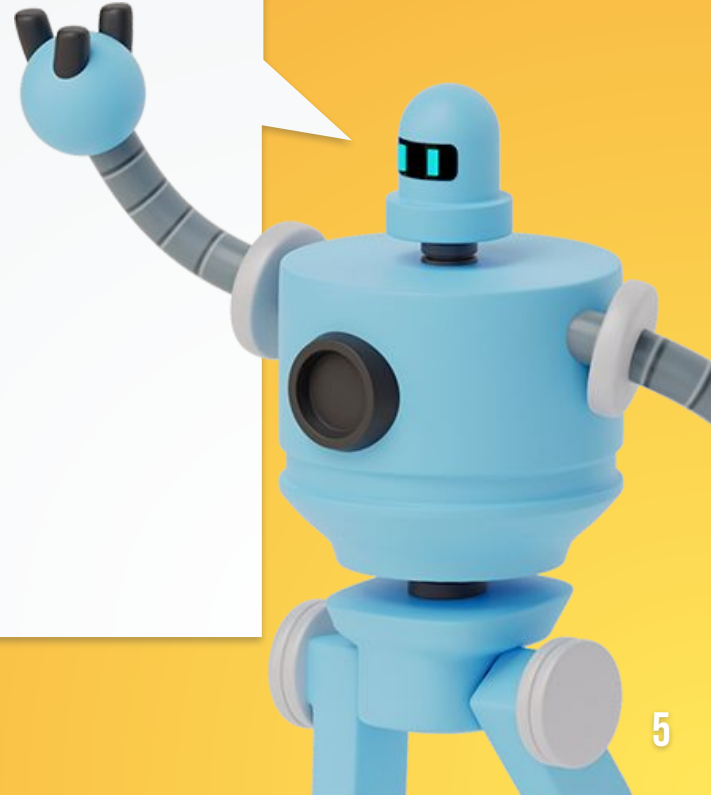


Think about/plan/sketch out how you want your hand to look like. How many fingers do you want to have? How many joints on each finger do you want? Where do you want your joints to be? Maybe you want to replicate an actual human hand or maybe you want to put your own creative twist to it. The design is up to you!

Sample design: 3 fingers, each with one joint

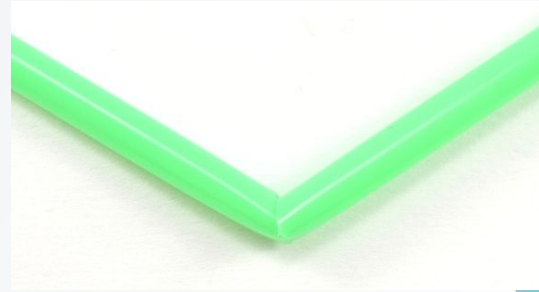
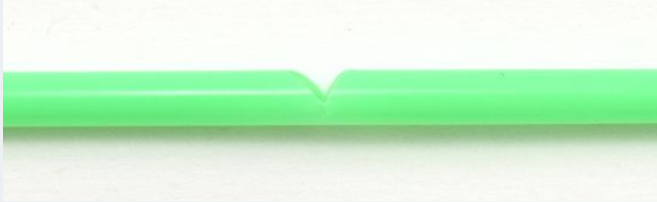
INSTRUCTIONS: THE FINGER

Cut your straws to your desired length. Maybe you want to cut off the bendy part of the straw or maybe you just want to leave the straw as is.

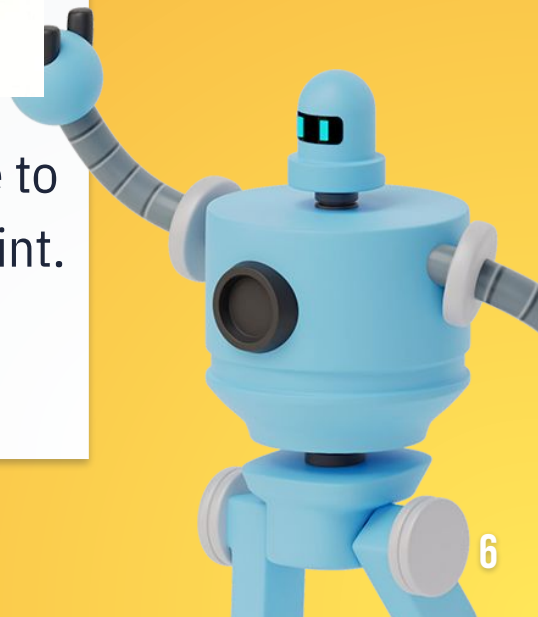


INSTRUCTIONS: THE JOINT

Cut a small triangular notch in a straw where you want your joint to be, about halfway along its width. You shouldn't be cutting your straw into two pieces!

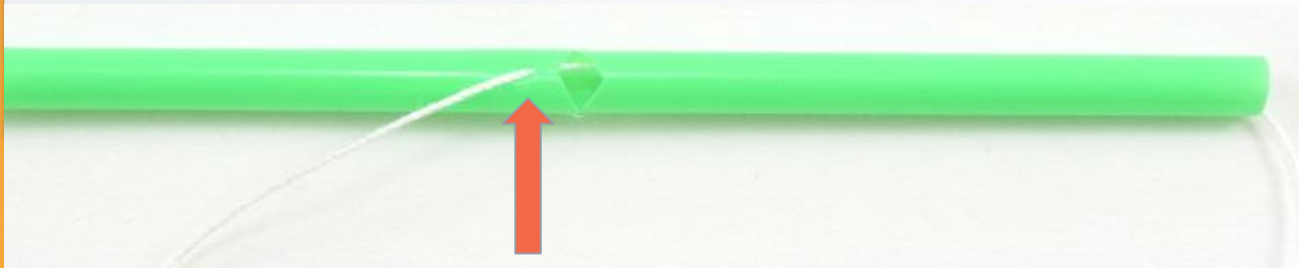


You should now be able to bend the straw at the joint.

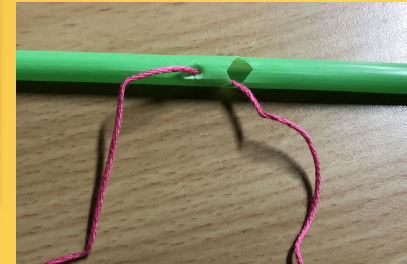


INSTRUCTIONS: THE TENDON

1. Use your thumb tack to poke a hole above each joint. You may need to poke the straw several times in the same place so that the hole is large enough for the string to fit through.
2. Cut a piece of string that is the length of your straw + the length of your cardboard tube.
3. Feed the string through the hole and through the end of the straw. Make sure the string passes under the join triangle you just made. Leave some string out of the hole you made. Use the image as guidance.



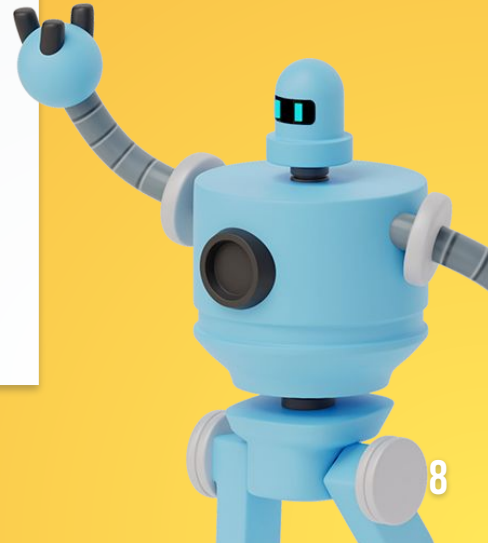
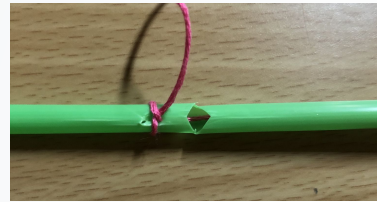
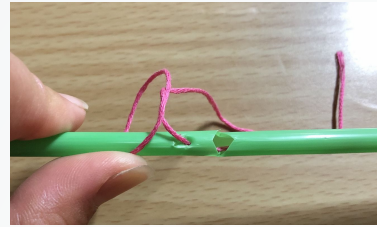
This part is a little difficult, so here's a tip: **Feed the string through the hole and then through the triangle joint. Then feed the string back through the straw and out the end of the straw.**



INSTRUCTIONS: THE TENDON

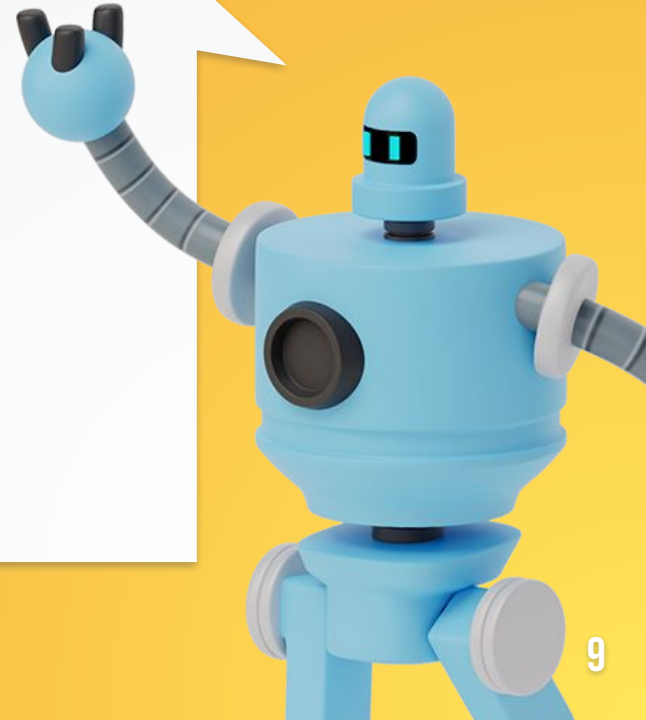
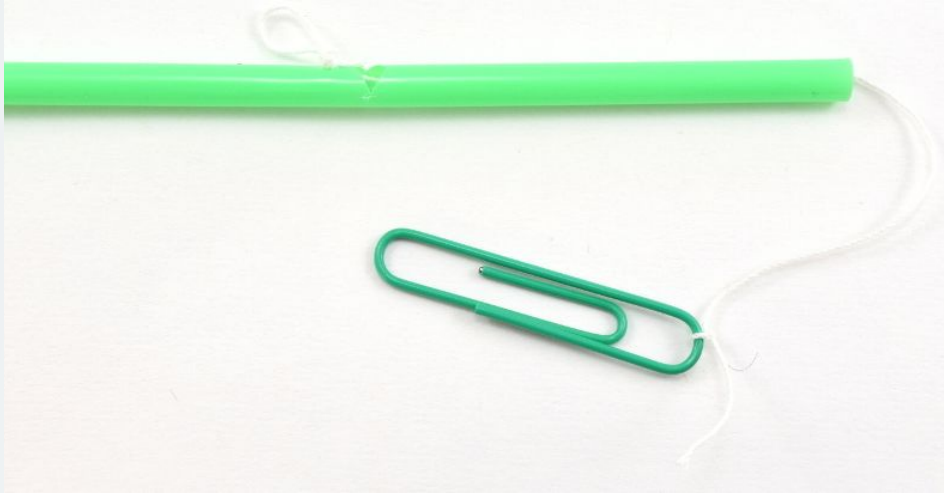
Make a knot around the hole.

1. Wrap the string around the straw.
2. Feed the end through the loop.
3. Tighten the know by pulling the end down.



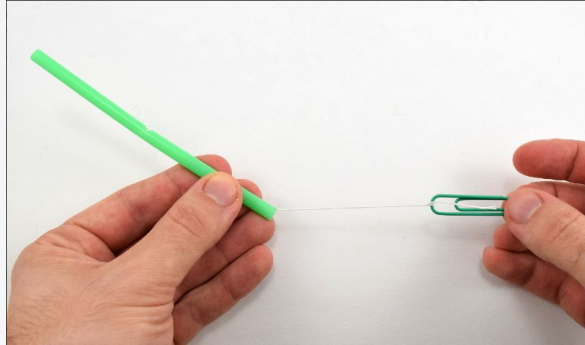
INSTRUCTIONS: THE TENDON

Tie a paperclip to the other end of the string.

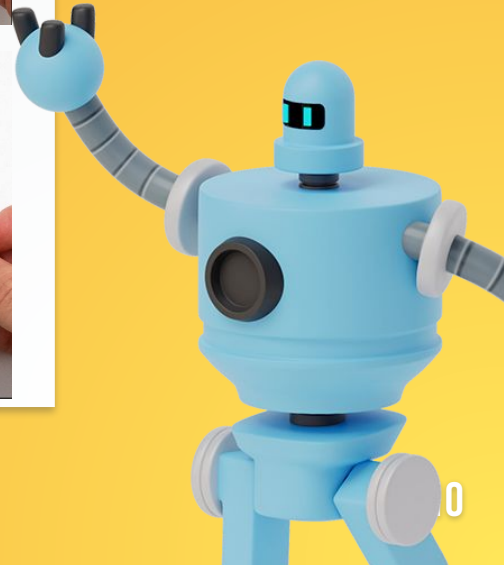
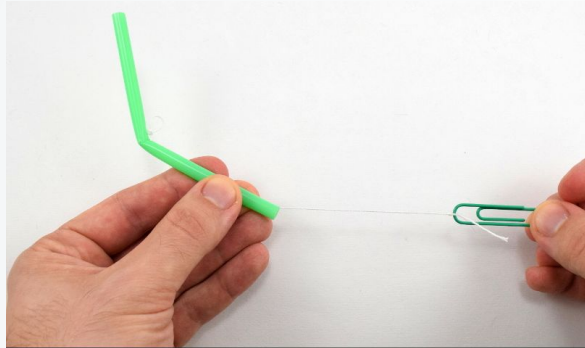


INSTRUCTIONS: THE TENDON

Hold the base of the straw with one hand and the paperclip with your other hand.



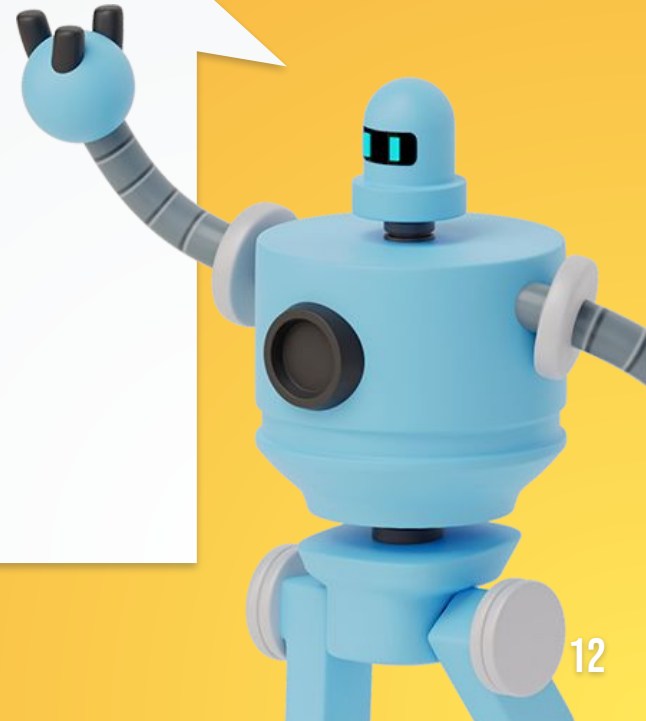
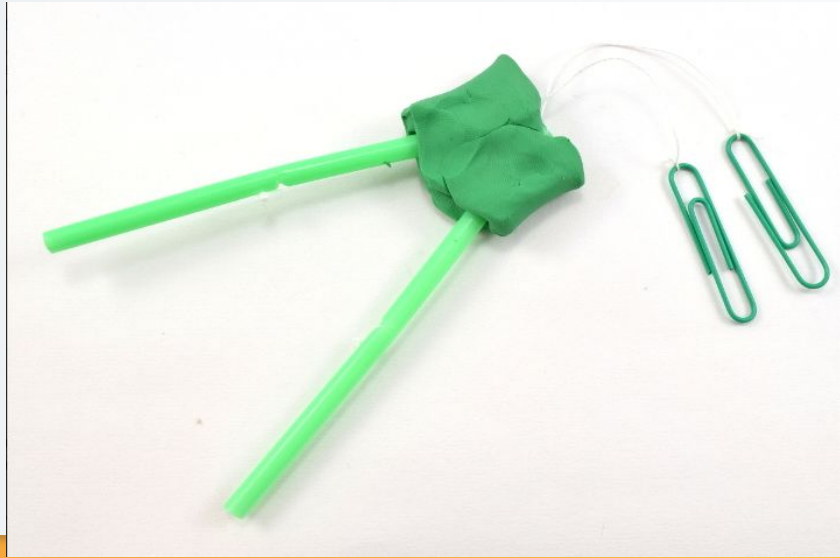
When you pull on the string, the straw should bend.



**MAKE THE REST OF YOUR FINGERS!! IF YOU NEED ME TO GO
BACK TO A CERTAIN STEP, JUST HOLLAR OR SAY SO IN THE
CHAT.**

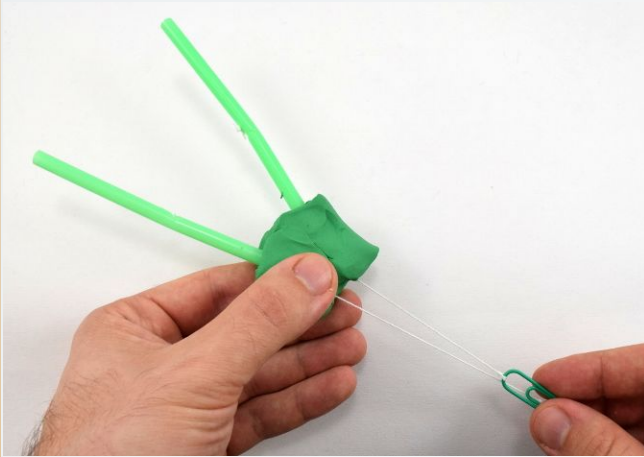
INSTRUCTIONS: PUTTING IT ALL TOGETHER!

Form a palm for your hand around the base of all your straws with modeling clay. Make sure the notches in the straws face toward each other.

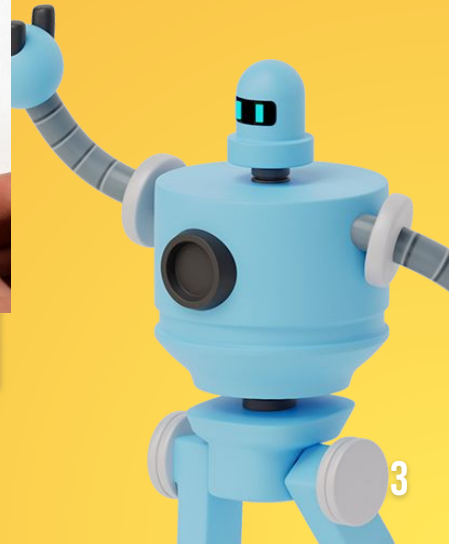
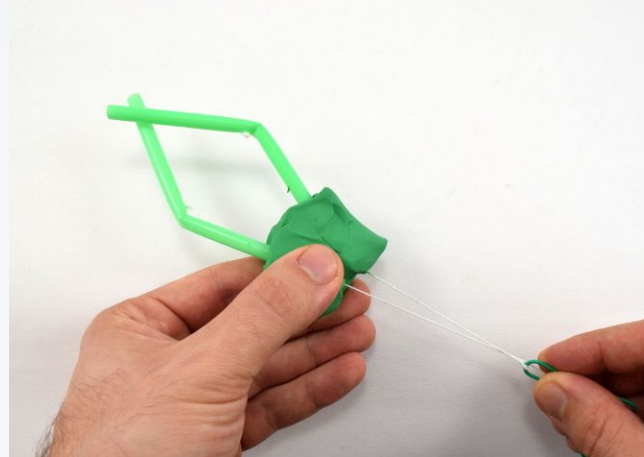


INSTRUCTIONS: PUTTING IT ALL TOGETHER!

Hold the modeling clay with one hand and the paper clips with one hand.

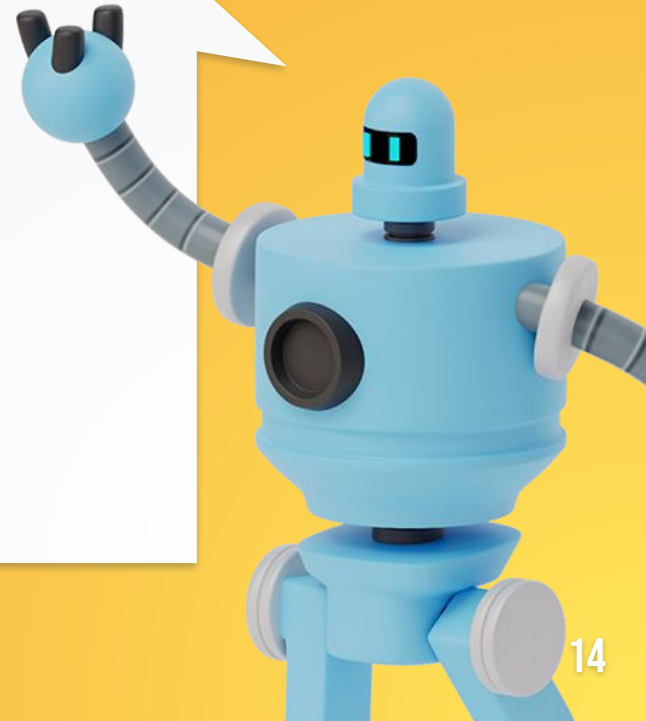
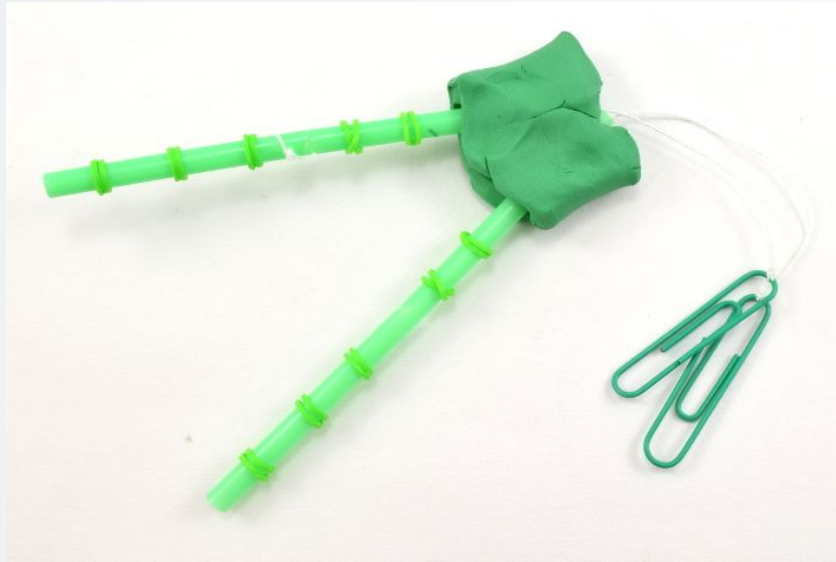


When you pull on the paper clips, the fingers should bend.



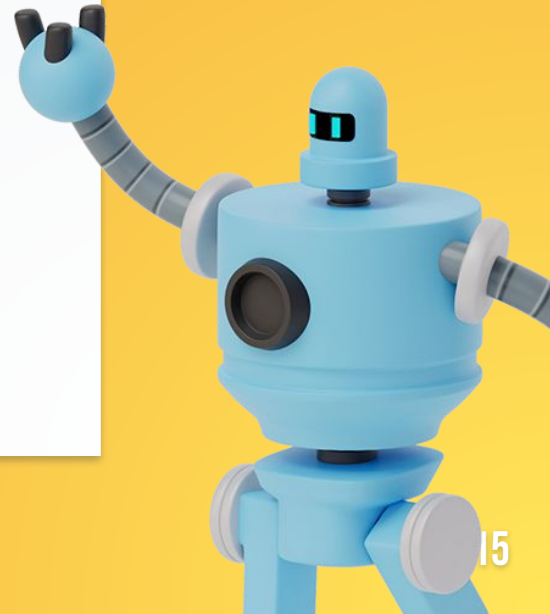
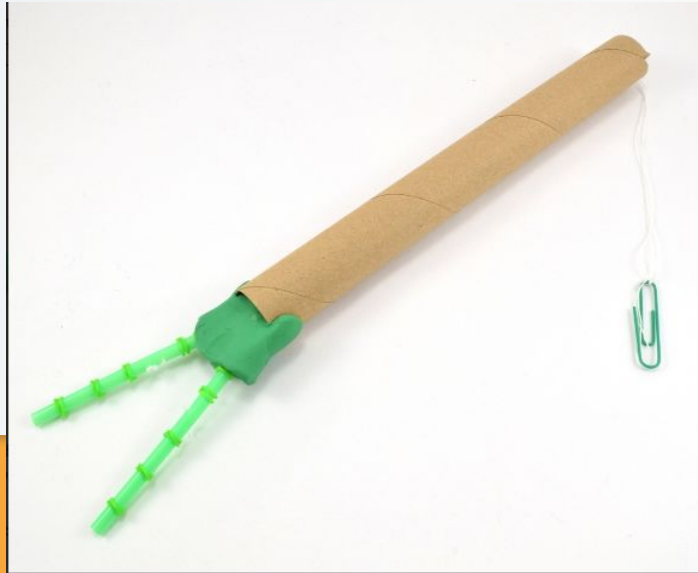
INSTRUCTIONS: PUTTING IT ALL TOGETHER!

Wrap rubber bands around the straws. This can help improve their grip.



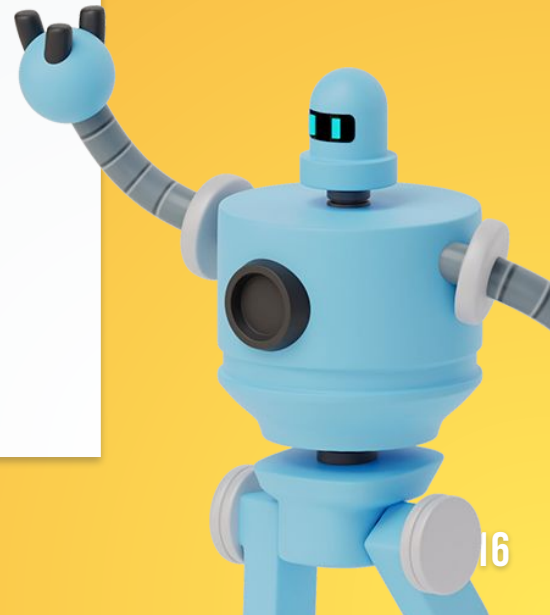
INSTRUCTIONS: PUTTING IT ALL TOGETHER!

Attach the modeling clay to the end of a cardboard tube to form an 'arm.' You may need to tie longer strings and thread them through the tube. You can also connect the strings to a single paper clip to control all the fingers at once.

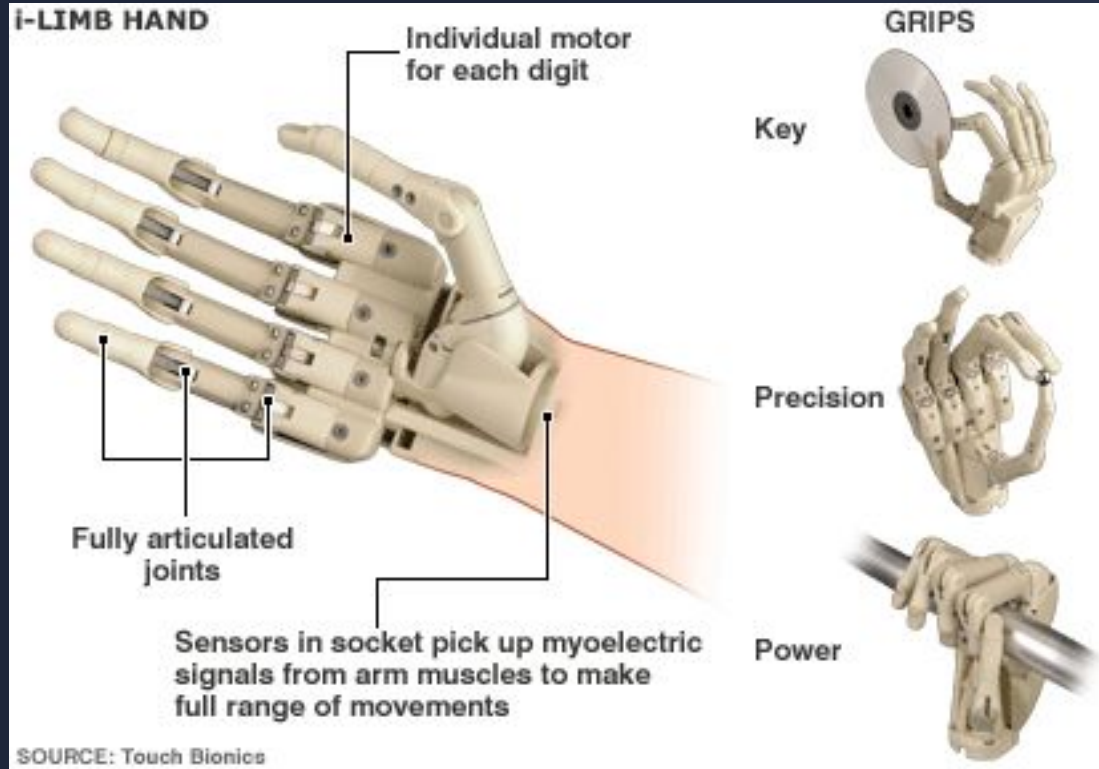


INSTRUCTIONS: TRY IT OUT!

Now, hold the cardboard tube, and pull on the string(s) to try and use your robot hand to pick up small, lightweight objects, like this ping pong ball.



TAKEAWAY



SOURCE: Touch Bionics