

Handy Robot

What's The Plan?

Stretch your hand open and closed. How many muscles do you think you just used? It's 18 muscles! Bioengineers investigate how our muscles, organs and other body parts work in order to make new technology. Explore the concepts of biomechanics and bioengineering by building your very own robot hand!

What You'll Need:

Here's a list of everything you'll need! Don't have something exactly? Get creative! Some of our suggested swaps are listed in Grey.

- 2 plastic straws | Paper straws
 - Modelling clay | Playdoh
- Plastic string | Thread or non- plastic string will also work, but a needle may be useful to help stick the string through holes in the straws
- A paper cup | A plastic cup or cardboard tube
 - Any tape
- A paper clip | A binder clip

What To Do:

Making the Fingers:

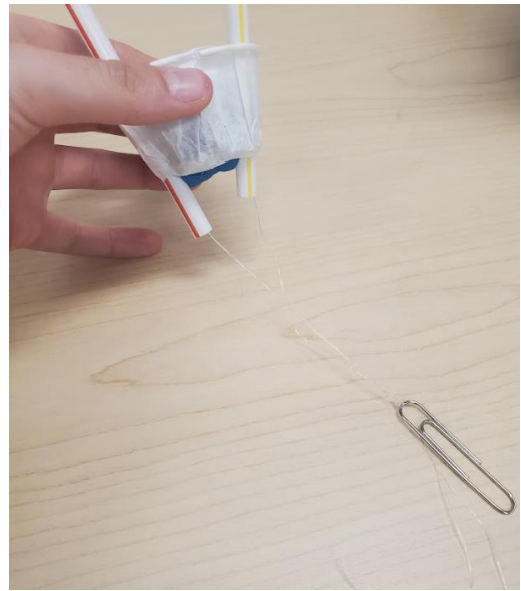
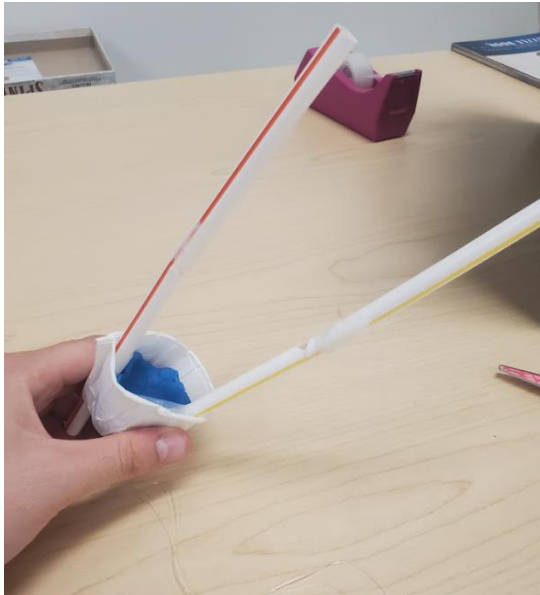
1. Cut a triangular notch halfway down a straw. The straw should bend at the notch just like your finger bends at its joints!
2. Make another cut about 1 cm above the triangular notch, on the same side of the straw.
3. Thread a string into the hole you made above the triangular notch and pull the thread all the way out the side of the straw closest to the notch.
4. Apply tape over the small hole where you pushed the string in from.
5. Test out your finger joint! Pull on the string and see if your finger moves just like a real one.
6. Repeat steps 1-4 to make a second finger.



Making the Palm:

1. Cut the bottom off of a paper cup.
2. Take some modelling clay and use it to attach the two fingers you made to one end of the paper cup. It may be easier to try and tape the straws to the side of the cup before you put clay in. When you do this, make sure you position the triangular notches on the fingers facing inward towards each other.

3. Tie the ends of both strings to a paperclip.
4. Test out your robot hand! Pull on the paperclip and see if you can move the fingers. Try picking up objects, pointing towards things, or giving a high five.



Take it Further:

See what you can add to your robot hand to make it even better! Does it need a magnet attached to the end of the fingers to help you pick up metal objects? Maybe the hand needs tape wrapped around it to make it even stronger, or you need rubber bands wrapped around the fingers so they can get a better grip when they try to lift smooth objects. Use your imagination to think of ways you could engineer an even better robotic hand, and then bring it to life with whatever materials you have available for this project.

Why Did We Do It?

Here is a list of important words we use during the project!

- *Engineer:* An engineer is a person whose job it is to design and build things. There are different types of engineers like chemical engineers, who design and build chemical mixtures and civil engineers who help design and build roads, bridges and buildings.
- *Bioengineer:* Bioengineers design medicines and devices that help people with physical illnesses. Today you became an engineer when you built this hand, since it could be a tool to help somebody with missing fingers, who has problems with their joints and can't bend them properly, or maybe can't reach objects as easily as others and needs this hand to help them.
- *Robot:* There are lots of different definitions of robot, but a good one for this activity could be a machine that can perform complex acts, such as reading and grabbing.
- *Prosthetic:* A prosthetic is one type of device that would be constructed by a bioengineer. It can help a person who is missing a body part by replacing that body part. Some people who are missing legs would have a prosthetic leg they can walk on, people who are missing noses could have a prosthetic nose, and people who are missing hands could have a prosthetic hand, similar to the one you built today!

- *Biomechanics:* Biomechanics is a field of science that studies how living things move. you used biomechanics to build this hand when you thought about how fingers need to bend and move to pick objects up.

How Did It Go?

We'd love to hear about all the amazing STEM projects you're doing! Show us your finished projects on any of the following social media platforms by tagging us!

Twitter: @MyMindsInMotion
Facebook: @mindsinmotion2014 || @ucactiveliving
Instagram: @ucalgaryactive



Let us know how you felt about the project! Please [click here](#) or scan the QR code above to fill out a short survey!