

Prosthetic Robot Hand

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Summary

In this experiment, you will learn how to construct a simple, prosthetic robotic hand. This hand will be able to grab onto various small, lightweight objects. However, the average person uses their hands for more than just grabbing! How can you design a prosthetic hand that can accomplish daily tasks such as writing, brushing your teeth, or opening a door? The way you design your hand--whether that be adding more fingers or joints, changing the materials, or changing the positioning--will greatly affect what kind of objects you will be able to pick up. For example, if your goal is to construct a hand that can easily hold paper cups, you may not be able to grab a great variety of objects like a cotton ball or a doorknob. Building a prosthetic robot hand that can easily accomplish several tasks in the same manner a human hand can is still a tough challenge professionals struggle with even today!


Materials

1. Tape or modelling clay
2. Drinking straws
3. 3 rubber bands
4. 3 paper clips
5. Scissors
6. Needle
7. Thread
8. Cardboard tube
9. Assorted objects to grasp

Procedure

Written Out Instructions:

1. Cut the bendy part of the three straws off, leaving the bottom pieces.

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2. Mark the middle points of the straws, and cut triangle-shaped notches at the marks without going all the way through. The notch should now act as a joint, so that it can bend while also being able to maintain its original shape. For a more complex finger with more joints, mark the fourths of the straw, so that three even notches are cut in the same direction at equal distances.
 3. Guide the thread through the needle and tie a knot at the end. Holding the straw vertically, poke the needle slightly above the notch, guide the needle out of the notch, and pull the string all the way until the knot is secured. If you have more than one joint, start with the notch at the top and work your way down, repeating this step with each individual joint.
 4. Guide the needle back through the notch, following the same direction downwards, so that the string falls through the bottom. Cut the needle off and tie the loose string to a paperclip.
 5. Repeat steps 3-4 with the other two straws.
 6. Wrap a rubber band around each of the straws, making sure to be gentle so that the straw does not bend. This will help the hand easily hold grip over objects.
 7. Take the tape or modelling clay and position the straws inside the cardboard tube with the paperclips going down the tube. Make sure that the tape or modelling clay does not touch the notch or the string. You should be able to control the paper clips from the bottom end of the tube--trim the tube if needed.
 8. Use more tape or clay to construct a base, covering the cardboard tube hole.
 9. Test out your prosthetic robot hand to pick up various small, lightweight objects, and brainstorm ways to modify and improve your design!

Materials & Resources

<https://www.sciencebuddies.org/stem-activities/build-a-robot-hand#instructions>

<https://www.sciencebuddies.org/science-fair-projects/engineering-design-process/engineering-design-process-steps>

