ARIZONA SCIENCE CENTER
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Biology/Engineering

Robotic Hand

Ever wonder how your hand works? Movements of the hand are mostly started by muscles in the forearm. Only the thin tendons of these muscles are found directly in the hand: the extensor tendons used for stretching the hand run through the back of the hand to the tips of the fingers, and the flexor (bending) tendons run through the palms to the fingers. For today we are going to focus on the flexor tendons that allow you to grip and grab.

Supplies

Cardboard
Box Cutter
Ruler
Scissors
Hot Glue Gun/Hot Glue Sticks
String
Bendy Straws

Challenge

Does seed size affect seed germination and sprout growth rate?

1. On cardboard trace a hand with about 4 inches of the forearm. At the end of the forearm trace an additional part that has a width of 1 to 2 inches and a length that will fit around the palm of your hand. Once all is trace use the box cutter to cut it out.
2. Use the ruler to bend the fingers where the joints will go. Next, use the ruler to bend the strap so that it will fit around the palm of your hand.
3. Using scissors cut 20 small pieces of straw that are about ½ inch long, 4 pieces that include the bendy part, and 4 pieces that are about an inch long.
4. Using the hot glue gun glue the small straw pieces onto one side of the hand, this will be the front of the hand. The first straw pieces to glue will be three on the fingers and two on the thumb in between the folded parts. The next 4 small straw pieces will be glued on the upper palm under the last fold of the four fingers. Below the last fold on the thumb poke a hole to fit a straw piece through and glue. The four longer straw pieces will be glued about two inches below the other straw pieces.
5. Using 5 different pieces of string thread them through the straws of each finger. Tie a loop that your finger will go through and tie the other end to the straw at the tip of each finger and the tip of the thumb.
6. To make the arm more secure hot glue strips of cardboard to the back of the arm.
7. Decorate if you would like!

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Questions

1. We focused on the flexor tendons but how do you think the extensor tendons would look on the robot hand?
2. If you were to build a robot hand again is it important to base the design on the hand or can you design something different?