

Robot Fingers

Robots grasp objects with a device called an end effector. End effectors come in many designs from jaws, suction tubes, and magnets to grippers that resemble the human hand. In this activity, students will individually construct a single robot finger that resembles a finger on a human hand. Working in teams, robot fingers will be combined together to pick objects.

Materials and Tools

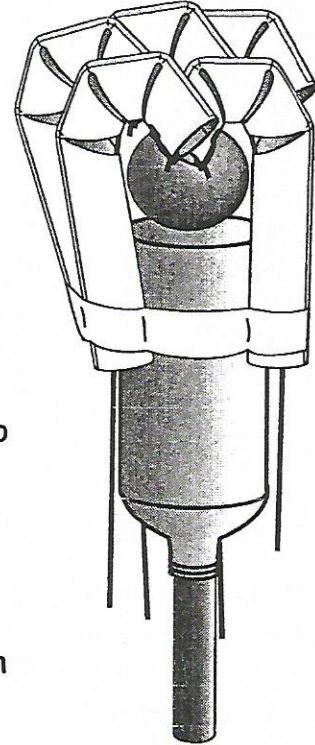
- Stiff paper (60 + pound stock) preprinted with pattern
- Cellophane tape
- String
- Paper punch
- Scissors
- Marshmallows or other objects to pick up

Procedures:

1. Roll the paper into a tube. Use the guide line on the paper to determine the diameter of the tube. When rolled the three diamonds and the small circle should be on the outside.
2. Tape the tube together along the entire seam.
3. Pinch the tube slightly and cut out the diamond shapes through all layers of the tube.
4. Punch a hole through the tube where the circle is located.
5. Tie a string to the tube through the punched hole. Drop the other end of the string through the tube to the other end.
6. Prebend each finger joint (diamond cutouts).
7. While holding the bottom of the tube in one hand, pull the string with the other to cause the finger to bend. When you release the string, the finger will straighten out again.

Extensions:

- Partner with another student to try to pick up a marshmallow from a desk top.
- Create a five-finger hand by taping five fingers around a plastic 1 liter water bottle. A dowel fitted into the bottle opening can be used for a robot arm.
- Tie loops at the free end of the strings and insert fingertips into the loops to control the motion of the fingers like a regular hand.



Robot Finger

1. Curl paper into a tube so that the left edge is next to this line.

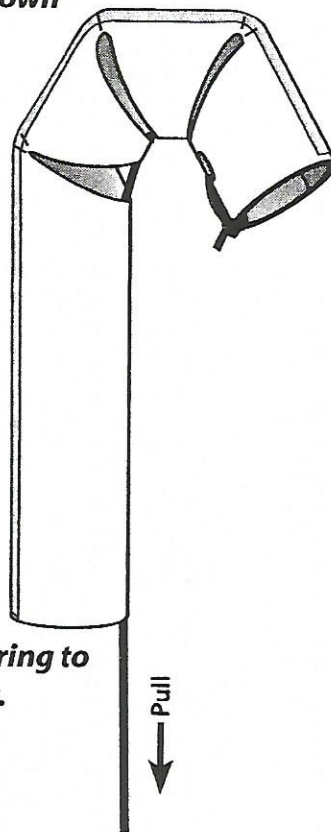
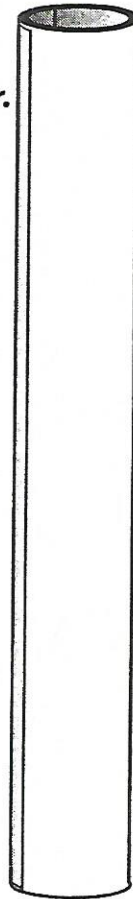
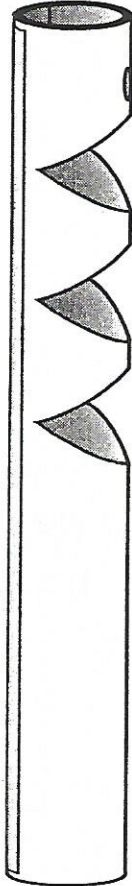
2. Tape the tube together.

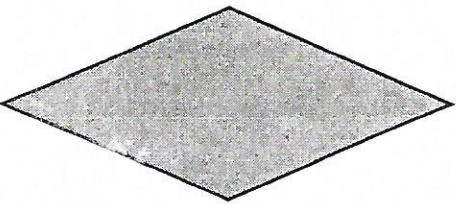
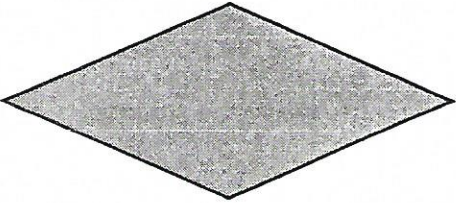
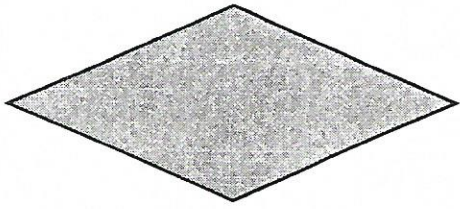
3. Punch out the hole with the hole punch.

4. Cut out the three diamond shapes through all layers of the tube.

5. Tie a string through the hole and run the string down through the finger.

6. Pull on the string to bend the finger.





B

A

Use the whole sheet of paper to roll the tube for the robot finger. The diamonds should be on the outside and the letters A and B next to each other.