Prosthetic Arm Challenge Activity Sheet

Activity 1 – Relocating Objects

Objective:

Design, build and operate a prosthesis from given supplies to grab various size objects **one a time**, release them into a container, and then remove them from the container.

General Supplies:

- 1 container or box
- Various objects such as empty paper clips box and empty water bottle
- Glue Gun
- Scissors
- Tape, white or black
- A few bamboo skewers
- Rolls of string

Supplies (per group of 2):

- 2 – sheets of card stock paper
- 9 – straws
- 14 – craft sticks
- 3 – pony beads

Instructions:

1. Using the given supplies, design and build prosthesis.
    a. Device MUST have artificial fingers and MUST open and close.
    b. Can NOT use opposite elbow, forearm or hand OR real hand to operate or control the prosthetic arm. ***Note: device for competition MUST be controlled by Arduino programming and components.**** This is to only demonstrate how a prosthesis can be built and controlled.

Creating One Finger with Two Joints

2. Cut one craft stick into three equal pieces.
3. Cut two pieces of straw slightly shorter than the pieces of sticks.
4. Glue one piece of straw to one piece of stick. Put the glue on the stick and not the straw or the straw may melt. Do this for a total of TWO straw/stick segments.
5. Glue the two stick segments onto a full straw. The sticks should be sandwiched between the straws now. Leave a small space in between each segment, so that bending is possible at the joint.
6. Glue full straw's excess onto a full length craft stick. Leave a small space between the full length craft stick and the first segment, so that bending is possible at the joint.
7. Glue one more straw segment onto the top of the full length craft stick in line with the other two segments.

8. Tie a pony bead onto the end of piece of string. Use the bamboo skewer to thread the other end of the string through the first short straw segment and through the two other short straw segments.
9. Wrap each segment with tape to reinforce the glue. Pre-bend the finger at each joint.

Creating Arm and Operation

10. Using the remaining supplies, create two more fingers, the arm and the operation of the fingers.

Testing

11. Attach the prosthesis and pick up the different objects from a table one at a time, release them into the container/box, and then remove them from the container/box.

**** Information on Arduino programming and components can be found at the following website:***

https://learn.sparkfun.com/mesa2015

Notes:

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Activity 2 – Tossing Hacky Sacks into a Target

Objective:

Design, build and operate a prosthesis from any of given supplies to grab hacky sacks from a cup **one at a time** and toss them into a Target Zone.

General Supplies:

- 1 – 18oz cups
- 3 hacky sacks
- Scissors
- Rolls of string
- Masking Tape

Supplies (per group of 2):

- 4 – sheets of card stock paper
- 5 feet masking tape
- 5 – index cards
- 2 – plastic spoons
- 5 – straws
- 10 – craft sticks
- 5 – rubber bands
- 10 small paper clips
- 10 large paper clips
- 10 fasteners

Instructions:

1. Using any of the supplies, design and build prosthesis.
    a. Device MUST have artificial fingers and MUST open and close.
    b. Can NOT use opposite elbow, forearm or hand OR real hand to operate or control the prosthetic arm. ***Note: device for competition MUST be controlled by Arduino programming and components.*** This is to only demonstrate how a prosthesis can be built and controlled.

Testing

2. Tape a triangle target zone 3 feet from launch line. No part of team member or the device may cross the launch line.
3. Place hacky sacks inside cup.
4. Attach the prosthesis, grab one hacky sack at a time from the cup, and toss it into the target zone.

Notes: