

Four Main Types of Robot Arm Designs

Note: The green shapes show the work area of the space that the arm is able to move within.

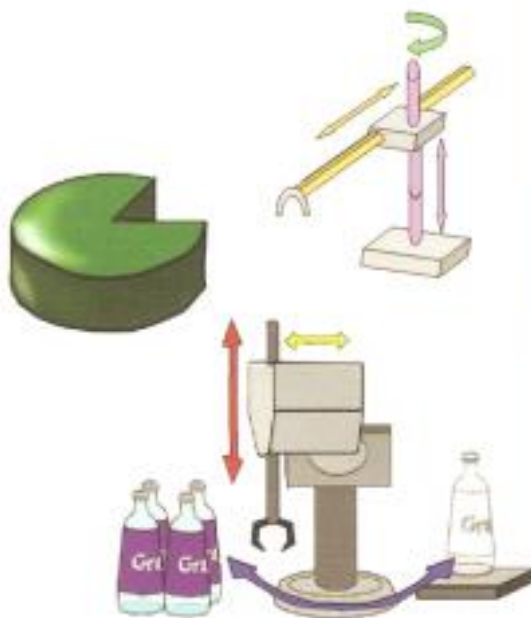
Jointed Arm



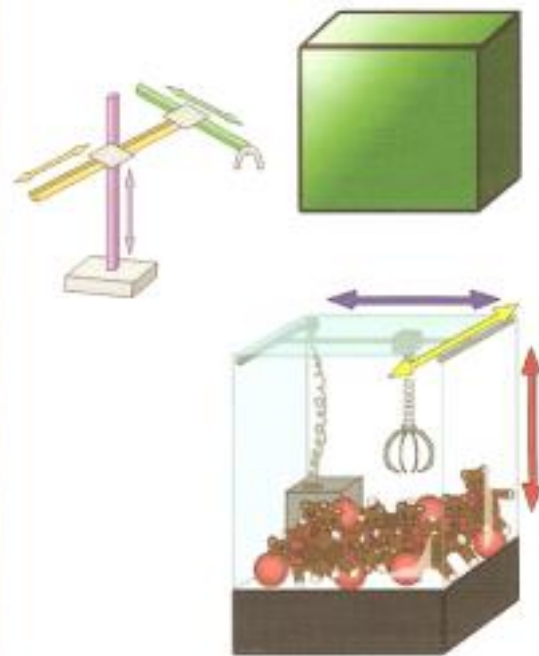
Polar Coordinate



Cylindrical Coordinate



Cartesian Coordinate





Activity I – Arm in Arm Build Team

Performance Task For Youth

You will build a robot arm from your design in Activity H.

Success Indicators

Youth will understand the principles behind arms and movement as demonstrated by their building a robotic arm using levers to pick up and move a weight from one spot to another location.

List of Materials Needed

- Robotics Notebook
- Collection of parts – items from the Trunk of Junk: drilled paint sticks, small trim boards, pegboard, straws, wood dowels, small bolts, paper brads, rubber bands, paper clips
- Other items: scrap parts, glue, bolts, screws, and other miscellaneous hardware or building kits, tape, structure parts, weights, and other supplies used before. (Making the arms from items the size of paint sticks, rulers, or yardsticks will make it easier to attach the syringes and grippers to be made and/or added to the arm in Activities Q and S.)
- Tables, cardboard bases, or pegboard building stands to support the arms as they are constructed
- Tools such as a low-temperature glue gun, hacksaw, hand drill with bits, scissors

Activity Timeline and Getting Ready

- Activity will take approximately 40 minutes.
- Use same grouping from Activity H, Arm in Arm Design Team.

Experiencing



1. Set out the materials. Have teams build the robot arms that they designed. Each robot arm must:
 - a. Use levers.
 - b. Be able to pick up a weight.
 - c. Be able to move in **two** of the three coordinate directions:
 - i. X – side to side
 - ii. Y – in and out
 - iii. Z – up and down
2. After building the robot arms, have the groups share the arms they built.
3. Build Teams should record actions and modifications in their Robotics Notebook.

Sharing and Processing

As the facilitator, help guide youth as they question, share, and compare their observations. Before they share with the group, have youth use their Robotics Notebook to record ideas, comments, and notes on the activities they have been doing. You may choose one of the questions below as a prompt. If necessary, use more targeted questions as prompts to get to particular points.

Ask the participants to describe how they made their arm:

- What type of parts did you use (fasteners, levers, etc.)?
- How do the arm movements of a robot act like our own arms?
- How are the arm movements of a robot different from our arms?
- What problems did you have building the arm? What worked well?
- Describe what you observed as you built the robot arm for this activity.
- What are the different types of robot arms and how do they work (move)?

Generalizing and Applying

- Identify the places we use robots. Are there any robotic arms in your house? How would your life be different if we didn't have robots? Why?

