

**CLASSROOM ACTIVITY**

# Robotic Helpers

## Key Learning Topics

- Algorithms
- Assistive Technology

## Overview

Assistive technology is any product that helps people work around challenges. Microcomputers are at the heart of this technology and are intended to repeat algorithms. Students will learn about different assistive technology robots and the different kinds of algorithms robots use to accomplish tasks for people. They will then choose a task a robot could complete and create a model of their design. Finally, they will create an algorithm a robot could use to complete a task.

## Target Audience

Grades 5–9  
Engineering, Technology

## Activity Duration

45–60 minutes class period(s)

## Essential Questions

How can we use robots to create spaces that function for all people?  
How do robots use algorithms to complete tasks?

## Materials

- Robotic Helpers Student Activity Sheet, one per student
- Gallery Walk Feedback Form, one per display
- Display Information, one per display
- Cardboard
- Popsicle sticks
- Hot glue
- Construction paper
- Pens
- Markers
- Crayons
- Paper

## Background Information

Assistive technology is any product that helps people work around challenges. It is a vast range of products from predictive word algorithms on cell phones to pencil grips. One specific class of assistive technology is an assistive robot. An assistive robot performs an ordinary daily task for the well-being of a person controlling the robot that otherwise would have to be completed by an attendant<sup>1</sup>. Robots can take all shapes and sizes, in fact some are virtual like Siri, Alexa, or Google Assistant.

## Procedure

### Introduction—10 min

- Introduce students to an example of a Socially Assistive Robot using the Viterbi video (<https://vimeo.com/40103952>). Ask students to identify what tasks the human featured in the video needed help with and how the robot was able to assist them.
- Pass out the Robotic Helpers Student Activity Sheet. Provide the following prompts for students to discuss with a partner.
  - What kinds of tasks might some people need assistance with?
  - If you did not have to worry about how to build the robot, what tasks could a robot help someone with? What would the robot look like?
- Ask students to share out some examples of robots they would want to see in practice.

### Classroom Activity—20 min

- Divide students into groups of 3–4 and provide a material set for each group.
- Explain to students that they will be creating a model of a robot that can complete a task. They will develop an algorithm to power their robot and work with a partner to refine the steps of their algorithm. After they have tested their algorithm and developed a model, students will engage in a gallery walk to review other ideas and provide feedback.
- Review the activity procedure with students and ask if there are any clarifying questions before they begin.
- Move about the room and monitor the student activity as they are working.

### Evaluation—10 min

- Instruct students to place one Gallery Walk Feedback Form in front of each project. The feedback sheet should remain at the display area.
- Explain the three levels of comments on the sheet (red, yellow, and green). Clarify with students that they must fill in all three levels of comments for each project they visit.
- Invite students to walk around and visit at least three other projects. They should follow the algorithm displayed at each station and view the model before making comments on the Gallery Walk Feedback sheet.

### Lesson Summary—5 min

- Have students read the feedback and respond in a prompt stating if they agreed or disagreed with the critique. They should explain specific feedback points and if and how they would incorporate them.

<sup>1</sup> Stanford, ENGR110/210 Perspectives in Assistive Technology, Slide 12, Jaffe, Nelson, Thiemer, (February 2, 2012), on the internet <https://web.stanford.edu/class/engr110/2012/04b-Jaffe.pdf> (August 21, 2019)

## Robotic Helpers

**Prompts:**

What other kinds of tasks might some people need assistance with?

If you did not have to worry about how to build the robot, what tasks could a robot help someone with?  
What would the robot look like?

**Materials**

cardboard, popsicle sticks, hot glue, construction paper, pens, markers, crayons, paper

**Activity procedure:**

1. Look back at some of the tasks you identified a robot could help with and select one of those tasks. Now, imagine you were the robot that would perform the task for someone who needs assistance. Think about the steps you would have to follow to make that happen. Your steps should be extremely specific forming what engineers refer to as an algorithm. An algorithm is a set of rules that are followed to solve a problem.
2. Make a list of all the steps your robot would need to follow to complete their task.
3. Pair off with someone in your group. Your partner should read and act out each step. If your partner gets stuck, or isn't completing the task as intended, students will need to revisit their algorithm.
4. Take turns acting out your algorithms to complete your tasks.
5. After watching your partner complete your algorithm, you may have a better idea of what your robot might look like. Sketch a picture of how you would design your robot. You may not need to design the entire thing but could focus on an arm or specific part.
6. Use the materials provided to build a model of your robot to go along with your sketch. As you build, you may want to focus on the size and shape or explore the functionality.
7. Place your model, sketch, and Display Information worksheet with your description above at your desk or designated place in the classroom.

# Robotic Helpers

List steps for task:

Refined Algorithm:

Sketch of your robot:

How does your robot help people?

<b>FEEDBACK FOR:</b>
<b>PROJECT TITLE:</b>

<b>FEEDBACK BY</b>	<b>What is something that doesn't work or could be improved?</b>	<b>What is something that is confusing or could be done differently?</b>	<b>What is something that works well, or you really like about the project?</b>

## National Standards

### Standards for Technological Literacy

Ch4S4 The cultural, social, economic, and political effects of technology.

Ch4S6 The role of society in the development and use of technology.

Ch5S8 The attributes of design

Ch5S9 engineering design.

Ch5S10 The role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Ch6S11 Apply the design process

Ch7S14 Medical technologies

### Common Core State Standards for English Language Arts

CCSS.ELA-LITERACY.L.4.3.C

Differentiate between contexts that call for formal English (e.g., presenting ideas) and situations where informal discourse is appropriate (e.g., small-group discussion).

CCSS.ELA-LITERACY.L.(5,6,7,8,9).6

Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases, including those that signal contrast, addition, and other logical relationships