

Social Robots

Grade Levels: 1-12

Duration: 45 min

Design a robust learning experience by selecting resources from this guide that fit the needs of your students. Reinforce learning before, after, and even during your visit by diving deeper into some of the science and engineering concepts.

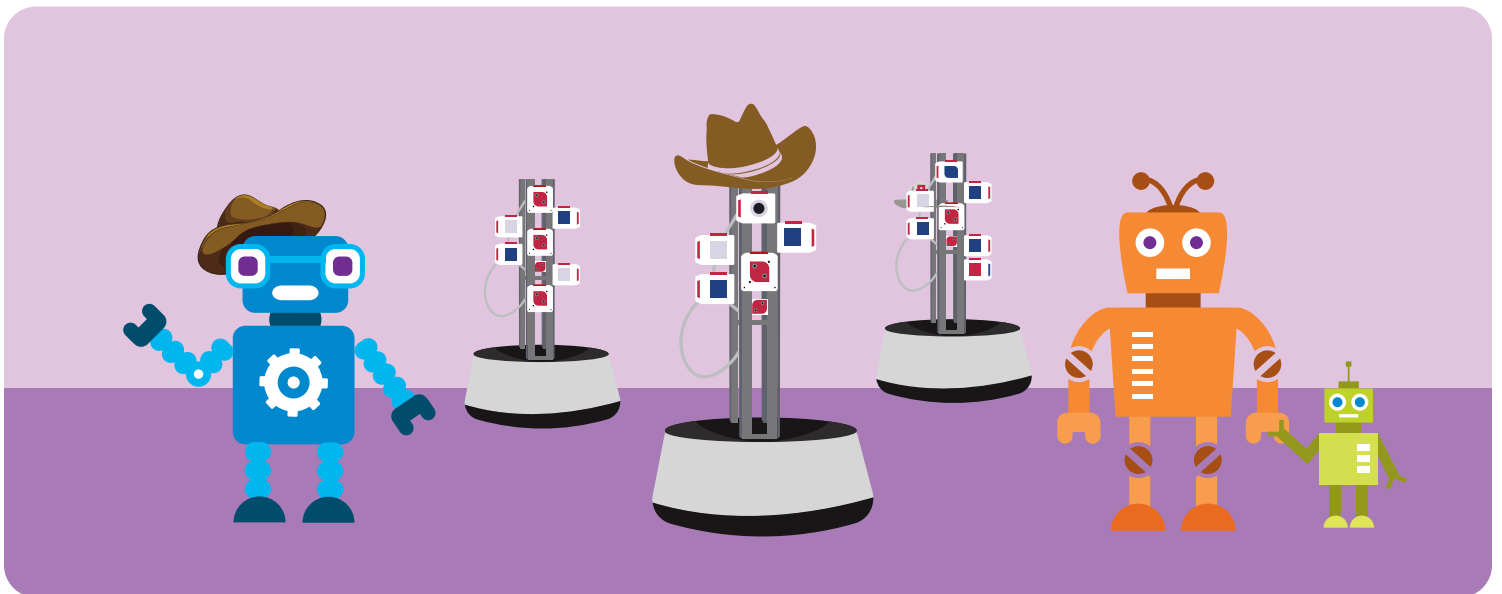


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When to implement

The following icons indicate when the activities should be implemented for the greatest benefit to your students' experience in the lab.



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Duration: 45 minutes

Concepts/Skills

Circuits, debugging, algorithms, problem solving, computational thinking




Objectives

Students will:

- Explore the basics of circuits including power, output, and wires.
- Use debugging skills to find broken and incorrectly connected pieces on a robot.
- Design an algorithm that would help future engineers debug a robot.

Adaptations

This lab experience offers flexibility to support students in working with computational thinking concepts and hands-on activities.

 Beginning Engineers	 Developing Engineers	 Advanced Engineers
Teams will work with simplified material options and will collaborate as a whole group to reflect and discuss the activity.	Teams will work with an expanded set of materials and collaborate in small groups to complete the activity, reflect, and discuss.	Teams will work with additional materials, collaborate in small groups, complete an additional activity, reflect, and discuss

Vocabulary



These are words and concepts that we will discuss in the lab. Your students' experience will be enhanced if they are familiar with these terms prior to your visit. If you need inspiration for vocabulary activities, please see our Vocabulary Choice Board activity.

Term	Definition
Abstraction	An element of CT, focusing on the big picture and what's important
Algorithm	An element of CT, step by step instructions to solve a problem
Circuit	A closed loop, including a power source and electrical device such as a light bulb, that provides a path for electrical current to flow.
Computational Thinking (CT)	A problem solving method that allows people / computers to tackle complex tasks; can be broadly applied across content areas and everyday life
Debugging	A systematic way to identify and solve problems (usually within code)
Decomposition	An element of CT, breaking down the problem into smaller (more manageable) steps
Iteration	Improving and building on an existing project
Optimization	Designing or iterating on a solution to make it as efficient as possible
Pattern Recognition	An element of CT, determining if there is a pattern and its sequence

Related Texts

The following titles may provide students with a greater contextual understanding of the field of climate change and sustainability and give additional opportunities to incorporate science and engineering into Language Arts lessons. We are not endorsing the following authors but feel that the information presented in these texts may benefit your students and enhance their learning experience.

Age Range	Title and author	Text Type	Description
Grade 1-3	“National Geographic Readers: Robots” by Melissa Stewart	Narrative, non-fiction	Colorful photos and descriptions of robots from today and tomorrow to encourage young readers to learn about the science behind robots.
Grades 3-5	“Robotics! With 25 Science Projects for Kids” by Carmella Van Vleet	Reference	A collection of questions, fun facts, and hands-on experiments to immerse learners in the world of robotics.
Grades 4-8	“A Rover’s Story” by Jasmine Warga	Narrative, fiction	The adventures of a fictional Mars rover determined to live up to his name.
Grades 7-12	“Michael Vey” by Richard Paul Evans	Narrative, fiction	A science fiction story with so many real-world examples it was recognized as an outstanding science trade book in 2012.

Exhibit Connections

Make connections between learning from the lab and the exhibits and programs found in The Tech Interactive’s galleries.

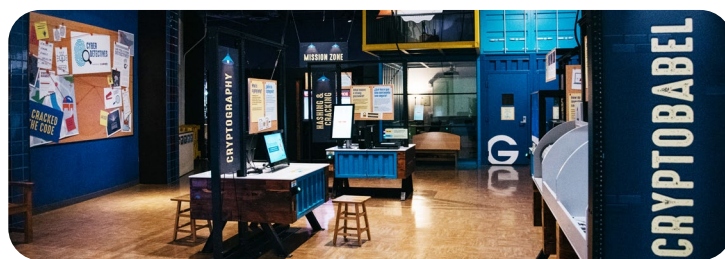
Cyber Detectives (Lower Level)

The Cyber Detectives Exhibit focuses on internet safety, online activity, and data security. Participants work through interactive challenges and games to learn about different areas of internet security to become a cyber security expert. Students can utilize computational thinking elements like algorithms and pattern recognition to solve puzzles and test their internet safety skills.



Creative Coding

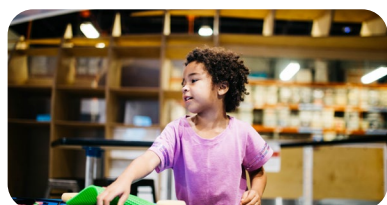
Students will program a list of instructions to get a ball through a maze. They can create unique solutions using fans, music, and more.



Cryptobabel

Students will learn how to code and decode secret messages. They will look for patterns and follow an algorithm to solve the puzzle and check their work.









The Tech Studio (Lower Level)



Students will work as teams and use the Innovation Design Process to design and build unique devices to solve engineering problems. Teams tinker and iterate on their designs while exploring engineering and teamwork concepts. Activities change out* and cover a wide variety of STEM disciplines.

*Check Today at The Tech to see which activities are available during your visit.

Lab-Related Activities

Activity	Description	Time
Program a Friend 	Students team up in this unplugged coding activity to write a program that can instruct a partner to complete a simple task.	 30 minutes
What's Happening to the Pikas? 	Students will work in teams to investigate how human actions have impacted pikas. They will look for patterns to explore how climate change is threatening the pika's survival.	 50 minutes
Patterns of the Moon 	Apply computational thinking skills to identify patterns in the cycle of the moon. Then modify a computer program in Scratch that shows how the moon appears throughout the lunar cycle.	 135 minutes
Redistricting Unplugged 	Students apply computational thinking to the real-world problem of redistricting as they use abstraction to redraw a series of maps.	 60 minutes



Looking for other hands-on activities or resources to use in your classroom? Check out our [education resources](#) page!

Next Generation Science Standards

Social Robots supports the following Next Generation Science Standards

Grades	Engineering Design	Earth and Space Science	Disciplinary Core Ideas	Crosscutting Concepts	Science and Engineering Practices
1	K-2-ETS1-1 K-2-ETS1-3		ETS1.A ETS1.C	Cause and Effect Systems and System Models	1, 4
2	K-2-ETS1-1 K-2-ETS1-3		ETS1.A ETS1.C	Cause and Effect Systems and System Models	1, 4
3	3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3		ETS1.A ETS1.B ETS1.C	Cause and Effect Systems and System Models	1, 3, 6
4	3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3	4-PS3-2	ETS1.A ETS1.B ETS1.C PS3.A	Cause and Effect Systems and System Models	1, 3, 6
5	3-5-ETS1-1 3-5-ETS1-2 3-5-ETS1-3		ETS1.A ETS1.B ETS1.C	Cause and Effect Systems and System Models	1,3, 6
6-8	MS-ETS1-1 MS-ETS1-2 MS-ETS1-3		ETS1.A ETS1.B ETS1.C	Cause and Effect Systems and System Models	1, 7
9-12	HS-ETS1-2		ETS1.C		

Social Robots supports the following Computer Science Standards

Grade	Computer Science Standard
K-2	1A-AP-11
3-5	1B-DA-07
6-8	2-CS-03
9-10	3A-CS-03



Visit thetech.org/fieldtrips for more information on field trip offerings, booking information, and more!

