

Robot Arms in Space

Name: _____

Lesson 10

Date: _____

Space - most often thought to begin about 62 miles (100 kilometers) above sea level at what is known as the Kármán line

CubeSat - a class of small satellites that are often made from off-the-shelf components rather than specialty-made components.

Deployable Solar Panel - a small solar panel found on Cubesats that is stowed during launch and deployed in orbit.

Job Outlook - the likelihood that the selected occupation will be available and hiring in the future

Engage

How might robotic arms be useful in space?

Answers may vary based on student's background knowledge. Robotic arms are useful in space because they can easily move objects and withstand the harsh environment.

Have you heard of a robotic arm being used in space? If so, how was it used?

Answers may vary based on student's background knowledge. But the space shuttle used its robotic arm to capture and deploy satellites.

Explore

While robotic arms have a key role in today's lesson, we will explore the related career of Robotic Arm Controller. After watching the video, find the following information about Robotic Arm Controllers:

Education needed to be a Robotic Arm Controller	Technicians typically need either an associate's degree or a postsecondary certificate.
Skills Needed to be a Robotic Arm Controller	Programming skills, electrical and mechanical understanding, and attention to detail.
Duties of a Robotic Arm Controller	Operate, test, and maintain electromechanical or robotic equipment.
What kind of work environment does a Robotic Arm Controller work in?	Technicians work with electrical and mechanical engineers. Most work full-time, and some work more than 40 hours per week.
Average Salary in your state	Varies by location, the national average is \$65,080 per year
What is the job outlook for this career?	Employment of technicians is projected to decline by 1 percent from 2023 to 2033.

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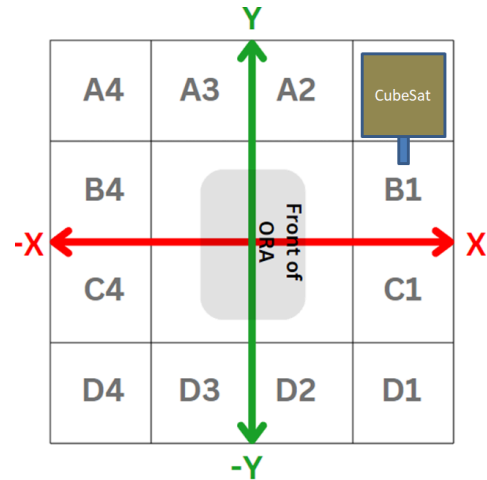
Date: _____

Elaborate

In this challenge, students will program ORA to deploy a stuck solar panel on a CubeSat model.

Task Requirements:

1. ORA must start in the initial position.
2. ORA must use the zero-clearance finger grippers to open the hinged lid of the CubeSat Cover.
3. ORA will grab the tape-tab from the small solar panel and lift the solar panel from the box.
4. ORA will hold the solar panel upright to charge the batteries of the CubeSat.
5. ORA will NOT return to the initial position.



Pseudocode	Code Blocks
Answers may vary	Example solution code

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Evaluate

Please answer the following prompts.

Remember to include your **name** and **date** on this paper!

1. Before this lesson, did you know that robotic arms were used in space? What is your favorite application for robotic arms in space, and why?

Answers may vary. Again, capturing and deploying satellites is pretty cool!

2. After testing your code in the Elaborate section, what was the most difficult part? What about that process made it most difficult?

Answers will vary based on the testing process.

3. Does the occupation of Robotic Arm Controller interest you? Could this be a future job prospect for you? Why or why not?

Answers may vary. Since the occupation is contracting slightly, it may not be a stable career in the future. But, with the prevalence of robotic arms, it seems like this occupation would see a boom.