How Can Robots Help Humans Explore?

Robots are a great tool for space exploration. Able to operate where there is no warmth, air, or gravity, they have been at the cutting edge of human space-exploration missions. How might they help us explore in the future?

Topics to Be Covered
- Design briefs
- Learning more about systems
- Scientific method
- Robotics

Objective
This is a great opportunity for students to learn what a robot is and what they can do. By doing basic research, students can find out more about the science of robotics and design their own robot to complete tasks required in a space mission. They will understand that robots take on many varied shapes and sizes and are used for a variety of different jobs in space.

Classroom Time
Three to four hours, depending on how many groups do presentations.

Materials Required
You will need computers with access to the Internet and a printer, as well as a poster board. Access to computer-based presentation tools like PowerPoint could also be helpful.

Lesson Starter
Ask your class what they know about robots and whether they know enough about them to define what a robot is. Perhaps they have read stories or seen TV programs with robots in them, doing amazing things. How do they think that this fits with reality? Move the discussion on to look at the real-world use of robots and the different ways that they can help humans. How might a robot be useful in space and how could it help us explore?

Lesson Development
Discuss the different aspects of robotics, from what they look like to how the design of the robot helps them function. Think about the ways that robots are used and the different ways that they can help humans. You can then make the discussion more specific by starting to think about the role that a robot might play in space exploration.

Each group should discuss and identify key points of interest and do further research on one in particular. Each group should record the key points of their discussion in the table. For their research they could use the Internet or books from the library, and you could even reach out to the community to see if there are any robotics experts out there.

As they do their research, your students can collect information about their ideal space robot and write their findings on the worksheet provided. They can also print pictures of the robots and keep details of any robots that they think have especially useful functions.

Using the information that they've collected, students could make a prototype of a model using their LEGO® MINDSTORMS® kits, make a collage, or create a detailed drawing of their own robot. They can then think about the functions that robot has and where in space those functions would be most useful. They also need to consider how a robot would be powered in the harsh environment of space.

Students should present their design to the class. They should give their robot a name that has something to do with its function, and label key parts and important functions of their robot. Finally, they should write a short paragraph about the robot, what it will do, and why they think this robot will make a difference in their life and in future exploration of space.

Final Presentation
The students will develop a poster and oral presentation explaining their research, providing potential solutions and challenges. They need to make their presentation as a team and ensure that each team member has a role. The presentation should include an explanation of how their solution can solve the various challenges of human space exploration.

Wrap-Up Discussion
Students should be encouraged to participate with their classmates in a final group discussion about the jobs robots could do to help humans establish an outpost in space.

Supporting Resources
If appropriate, direct the students to NASA eClip™, which may be found under the Education section of NASA.gov. There they will find a wealth of topic-related videos.

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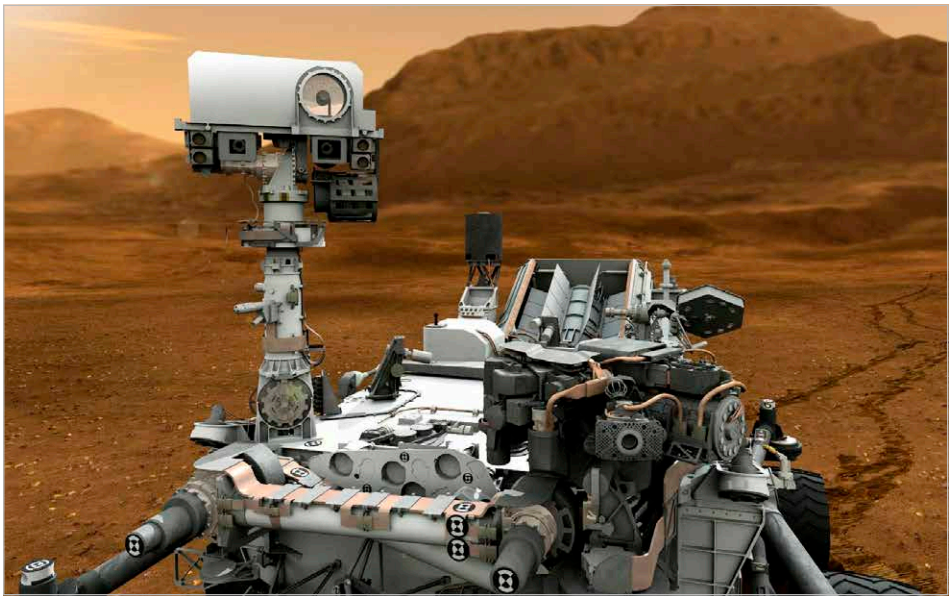
Project Introduction
Robots are a great tool to help space explorers. They can work in places where there is no air, and even in places where there is no warmth or gravity. In fact, each time humans have been to space, robots have been there in many different shapes and sizes to help them.



How might robots help us explore in the future?

Start by having a discussion about robots. What do you think a robot is? What can they do? Perhaps you have read a book or seen a TV program that featured robots. What could they do? What functions did they have and how would they work in space?

When you've discussed robots, you can move on to talk about how you might design your own robot. What would it look like? What could it do? How would it be powered and, more important, how could it help us explore space?

Practical Exercise
Talk in your group and find an area of robotics that interests you. When you find one area, do some research on the Internet or in the library and record what you find in the table that your teacher has shown you.

When you've done your research, start thinking about your ideal space robot. If you manage to find pictures of robots that do some of the things you think are important, try to include them, too, and keep the details of any that have special functions that you think might help it in space.

Using the information that you've found, build a model, make a collage, or create a detailed drawing of your own robot. Think about what things it could do and how that would be useful in space. Remember to think about how it would be powered, as this is very important for space robots.

Doing Your Presentation
Present your model or your chosen design to the class. Give the robot a name that you think describes what it does, and label key parts and important functions. Finally, write a short paragraph about the robot, what it will do, and why you think it will make a difference in your life and the future exploration of space.

Create a poster and presentation explaining your research, and explain how you'd find solutions to all the different challenges. Do the presentation as a team and make sure that each team member has a role. Maybe one of you could even be your robot!

Final Discussion
Take part in a final group discussion about the jobs robots could do to help humans in space.