

Robots

A Reading A-Z Level T Leveled Book
Word Count: 1,001

LEVELED BOOK • T

ROBOTS

Connections

Writing

Do you think using robots is a good idea? Write a paper stating and defending your opinion. Include details from the book to support your view.

Science and Art

Research to learn more about a robotic rover that explored the surface of Mars. Draw a diagram of *Spirit* or *Opportunity* and label the robot's features.

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Focus Question

What can robots do? Why do we use them?

Words to Know

adjust	mechanical
assembly line	programmed
automatic	repetitive
complex	sensors
instinct	

Cover: A group of robots perform a dance number at a robot exhibition.

Title page: The Japanese company Murata created a robot that can ride a bicycle like a person.

Page 3: A robot goalie blocks a goal during the 2018 RoboCup German Open.

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Correlation

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Tireless Workers

Imagine working at a job picking up nails and putting them into boxes as they pass through an **assembly line**. Imagine that this is the only thing you do all day and night. You never get to take breaks to eat, sleep, or go to the bathroom.

This kind of job is very **repetitive**, which makes it difficult to stay focused. After a while, you'd be tired, cranky, and exhausted. But robots can do this job perfectly every time, without complaining.



Robotic arms are often used in factory assembly lines.

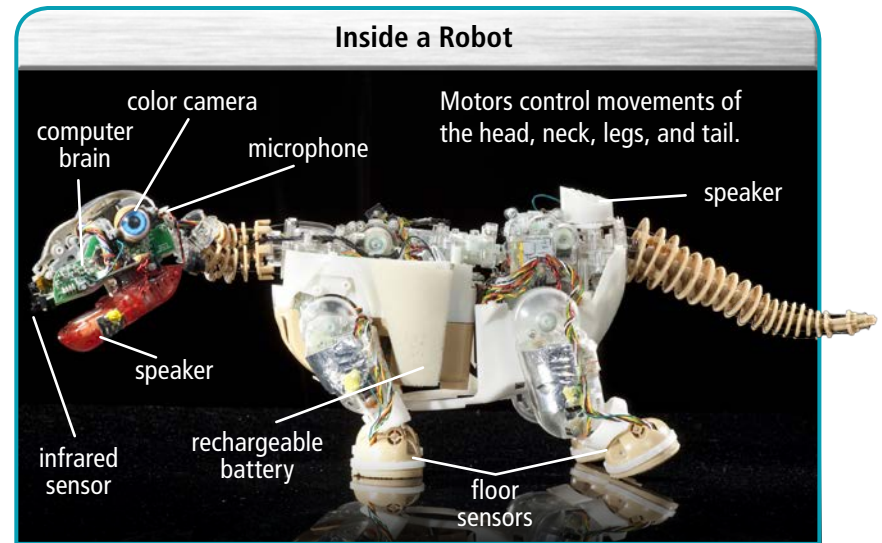


This robot swims like a fish and has a video camera inside.

What Are Robots?

The word *robot* comes from the Czech word *robota*, which means “forced labor,” or hard, boring work. In fact, many robots today are factory robots. Many are simple robot arms. Some can grip pieces of metal, while others weld them together. Still others drill or spray-paint parts. Robot arms with a lighter touch sort items, from chocolates to tiny screws.

Robots are machines with **mechanical** bodies, information **sensors**, and computer brains. Most robots can move or have moving parts. Some robots look like people, but robots come in many shapes and sizes. Some walk on legs, while others use wheels or tracks to move. Some robots fly like insects, swim like fish, or even crawl like snakes.

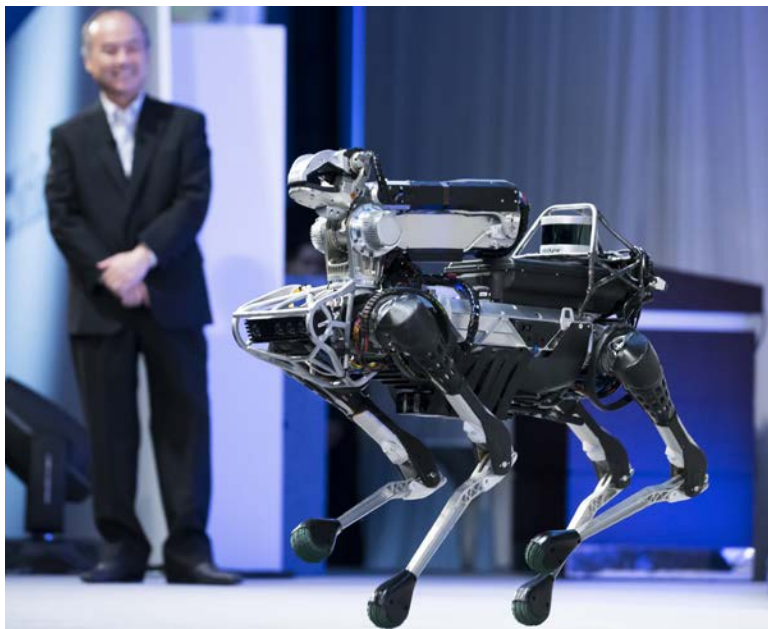


Pleo, the baby dinosaur robot, needs many parts to work.

Many robots use video cameras and microphones to act as their eyes and ears. Robots are **programmed** to perform certain tasks, either on their own or by remote control. The program plans every step of the robot’s task. Most robots cannot do anything that they have not been programmed to do.

Robotics

Robotics is the science of designing, building, and operating robots. Some schools and summer camps offer robotics programs where students work together to create their own robots. Teams of high school students around the world participate in yearly competitions to see who can build the best robots.

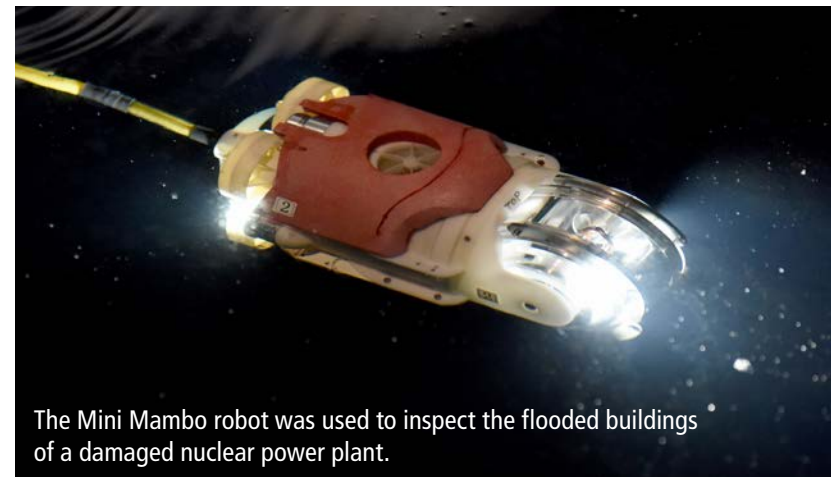


The Boston Dynamics SpotMini is a complex robot that moves like a dog and can use the arm on its back to open doors and handle objects.

Simple or Complex

Simple robots can perform basic tasks such as moving car parts on an assembly line. For this job, the robot only needs one arm, a sensor that tells it where the parts are, and a program to control its movements.

As robots get more **complex**, they need more programs in their computer brains. Robots are usually built to be good at doing just a few things. It is much easier to build ten robots to do ten different things than it is to build one robot to do all ten things.



The Mini Mambo robot was used to inspect the flooded buildings of a damaged nuclear power plant.

Danger Zones

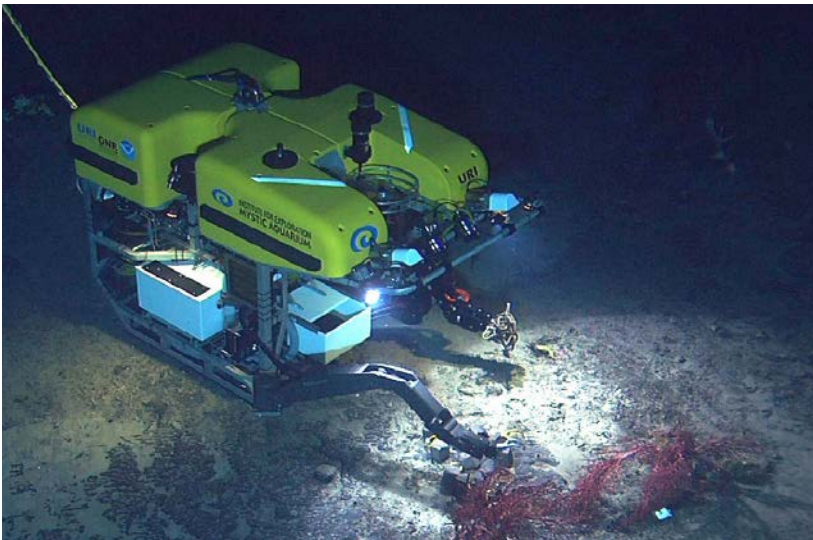
Some robots are built to go places that are too dangerous for humans. After an earthquake damaged a nuclear power plant in Japan, officials sent in robots to check the damage. The radiation from the nuclear accident would have killed any living creature that entered the damaged plant.

Volcanoes can also be very dangerous. Eight scientists died while studying a volcano in South America in 1993. Dante II was built to get samples of gases safely from Mount Spurr, a volcano in Alaska. The eight-legged crawler robot successfully brought back samples of the gases, though it was damaged during the mission.

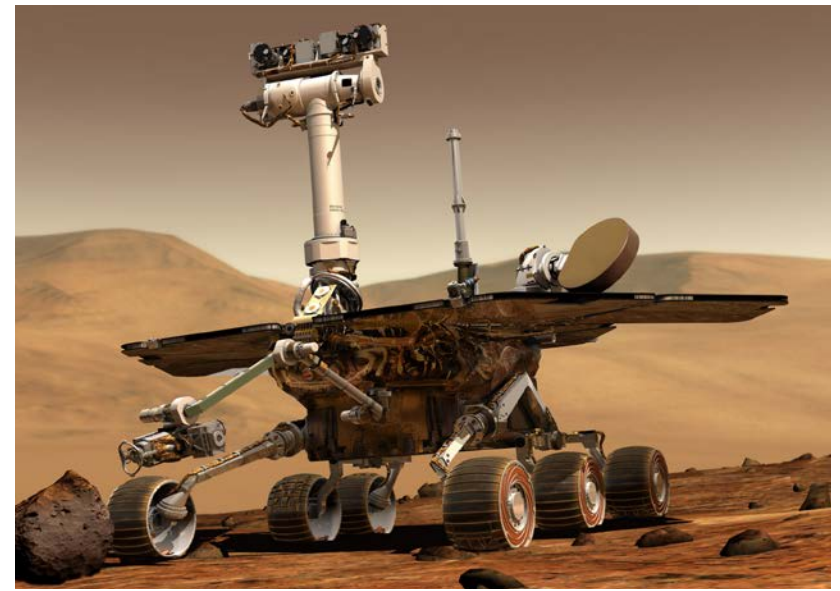
Robot Exploration

Remote-Operated Vehicles (ROVs) are often used to investigate places on Earth that are hard for people to reach. ROVs use lights, cameras, and scientific instruments to search for new life forms living deep in the oceans.

The remote-controlled Nomad robot explored the Atacama Desert in Chile, traveling 215 kilometers (134 mi.) in forty-five days while collecting rock and soil samples. Nomad went on to successfully search areas of icy Antarctica for rocks that fell to Earth from space.



The *Hercules* ROV recovers an object from the seafloor.



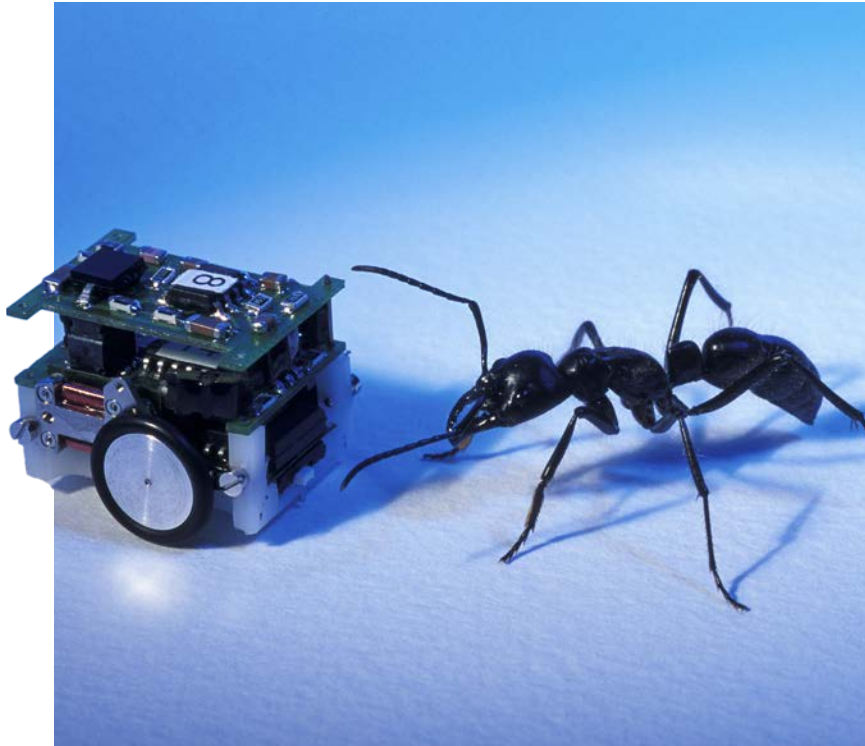
The *Spirit* and *Opportunity* robotic rovers worked many years longer than expected on the surface of Mars.

The *Spirit* and *Opportunity* robots explored the surface of Mars. These identical robots were programmed to act as geologists—scientists who study rocks. They were equipped with tiny rock drills, microscopes, and instruments that can tell what rocks are made of. Scientists controlled these robots by sending radio signals through space.

Robots don't need food, water, or air. They don't age or get bored, and they don't even need a return trip home. For these reasons, much future space exploration will involve robots rather than people.

Tiny Robots

Scientists are researching and developing tiny robots, some of which are smaller than the width of a human hair. Such tiny robots might one day be used by doctors to inspect sick or injured bodies from the inside. Groups, or “swarms,” of tiny robots working together could perform surgery to heal wounds or track down and destroy cancer cells.



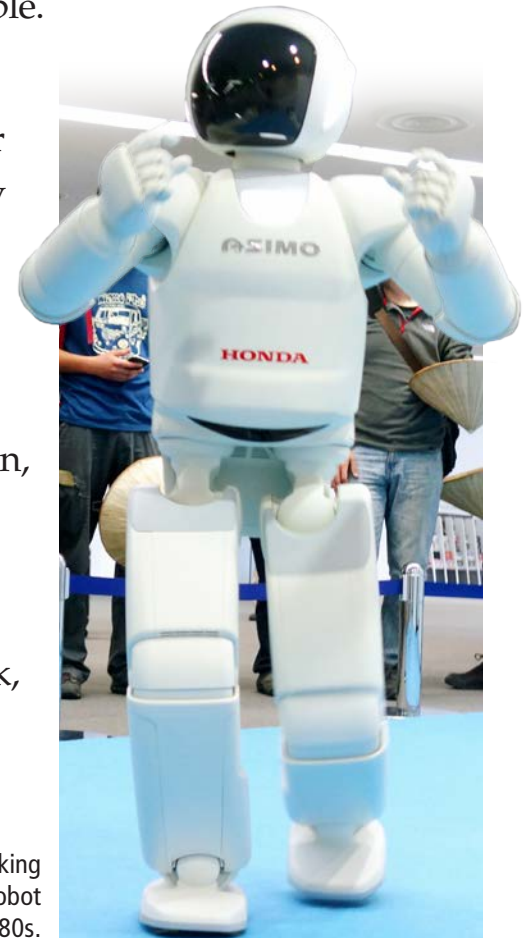
This tiny robot (left) was built to study how ants behave and is smaller than some ants.

Robotic People and Animals

People have tried to build humanlike robots for decades. Some robots have two arms and legs to move and work as people do. Some robots even have faces and hair to appear more like us. These robots may look like people, but so far they are not very good at acting like people.

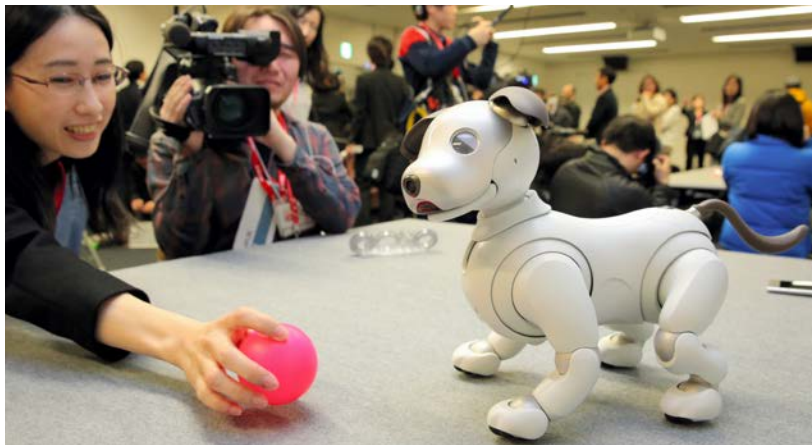
One problem is that it's hard for robots to do many different things the way people can. In fact, the more **automatic** a task is for a human, the harder it is to program a robot to do it. Each of us learned to walk, but after that, we do it by **instinct**.

Honda has been working on the ASIMO robot since the 1980s.



To get around this problem, scientists begin by programming a robot to only deal with one very simple task, such as rolling or walking on many legs. Then they add other simple programs one by one until the robot can do many different tasks successfully. This idea began with robots that imitate insects. These tiny bug-bots move and react just like insects and can send signals to each other.

Several companies have built robot dogs as expensive toys and companions. These dogs bark, move, and perform tricks. More advanced models can recognize their owners' voices and faces, and respond with actions or flashing lights.



Sony's robotic dog AIBO can learn people's faces and play games.

Robot Intelligence

True artificial intelligence, or AI, involves human-level intelligence. It involves the ability to learn, react to new information, and make decisions independently. Scientists are still working on creating computers and robots with real AI. Some robots are able to **adjust** their own programming as they gain experience. This kind of machine learning allows robots to improve the way they work over time.



Sophia is a robot that uses artificial intelligence to talk with people.

Do You Know?

Smart cars, also known as self-driving cars, use many of the same technologies as robots. Smart cars use cameras and sensors to sense what's going on around them. Their computer brains calculate the best direction and speed to travel safely. Mechanical parts steer the cars and control their speed.

The Future of Robots

Robots are already a big part of modern life, and they are becoming more common every day. Robots work in many factories, vacuum people's homes, and mow their lawns. In some areas, robots deliver meals from restaurants or fly through the sky carrying packages from online stores. As robots continue to improve, we can expect them to keep changing the way we work and live.



Glossary

- adjust** (*v.*) to change something so it works, looks, or fits better (p. 14)
- assembly line** (*n.*) a series of machines or people that build a product in a step-by-step process as it passes by (p. 4)
- automatic** (*adj.*) done or happening without thought or conscious effort (p. 12)
- complex** (*adj.*) having many different parts; difficult to achieve or understand (p. 7)
- instinct** (*n.*) a natural ability or reaction that is done without thinking (p. 12)
- mechanical** (*adj.*) made or powered by machines; of or relating to machines or tools (p. 5)
- programmed** (*v.*) given instructions that enable a computer or other machine to complete an action (p. 6)
- repetitive** (*adj.*) done or happening over and over again (p. 4)
- sensors** (*n.*) devices that sense and measure or react to physical conditions, such as heat or motion (p. 5)