

UNIT 28

ROBOTICS

Objectives: at the end of the lesson, students will be able to:

1. learn key terms related to robotics, such as manipulator, actuator, end-effector, and autonomous;
2. use robotics vocabulary in sentences and explanations;
3. describe how a robot performs a simple task using its components.

Lead-in: Let's Talk!

1. What do you know about robots?
2. Have you ever seen a robot? What did it do?

Vocabulary Building

Key Terms

Drive power – is the energy that makes a robot move

Robotics – is the scientific study of robots and their structure and movement

Autonomous – an autonomous robot can operate on its own without help from humans

Pendant – is a device that a person uses to control and guide a robot's movements

Joints – are the places where the parts of a robot connect. They allow the robot's parts to rotate

Actuator – is a piece of equipment that uses energy to make a robot move

Manipulator – is the arm of a robot. The end-effector sits at the end of it

End-effector – the hand or tool at the end of the robot's manipulator

Equality constraint – is a value that specifies the end-effector's position and movements

Enabling device – is a device that a person activates to allow a robot to move

Activity: Match the words (1-10) with the definitions (A-J).

1. Drive power	A. is a device that a person uses to control and guide a robot's movements
2. Robotics	B. is a piece of equipment that uses energy to make a robot move
3. Autonomous	C. is the scientific study of robots and their structure and movement
4. Pendant	D. is the arm of a robot. The end-effector sits at the end of it
5. Joints	E. the hand or tool at the end of the robot's manipulator
6. Actuator	F. is the energy that makes a robot move
7. Manipulator	G. are the places where the parts of a robot connect. They allow the robot's parts to rotate
8. End-effector	H. is a value that specifies the end-effector's position and movements
9. Equality constraint	I. an autonomous robot can operate on its own without help from humans
10. Enabling device	J. is a device that a person activates to allow a robot to move

Reading

Exploring the Basics of Robotics

Robotics is an exciting field that combines technology and engineering to create machines capable of performing tasks both autonomously and manually. A key component in many robots is the manipulator, which consists of several joints and actuators. The actuators provide the drive power needed to move the joints and perform actions. At the end of the manipulator is the end-effector, which interacts with objects and performs specific tasks, such as gripping or welding.

Robots can operate autonomously using pre-programmed instructions or real-time data from sensors. In contrast, some robots are controlled manually via a pendant, a hand-held device used to direct the robot's movements. The robot's actions must account for various constraints and ensure that all parts work in equality to achieve precise results.

An enabling device, such as a sensor or controller, helps the robot function correctly by providing essential feedback. Together, these components allow robots to efficiently perform complex tasks in diverse applications.

Activity: Read the text and answer the questions.

1. What is an enabling device, and why is it important in robotics?
2. Explain the difference between autonomous robots and those controlled by a pendant.
3. Describe the function of an actuator in a robotic system.
4. Why is it important for a robot to manage constraints and ensure equality in its operations?
5. What might be an example of an end-effector, and what task could it perform?

Speaking

Group Work Activity: Present a Simple Robot

Ask students to work in a group and to think about a simple robot for a specific task. Have them choose at least three components (e.g., manipulator, actuator, end-effector) that would be essential for the robot. After discussion in a group, let them present their robots to the class.

They need to discuss the following questions:

1. What task is the robot designed to perform?
2. Component Roles: How does each chosen component contribute to performing the task?
3. How are the components integrated to ensure the robot operates effectively?

Home assignment

Write about a robot that can do something. Submit a written document (100-150 words) containing your component descriptions, comparison, and robot design explanation.