

1 | What Is Robotics?

Standard: NGSS MS-ETS1-1: Defining engineering problems in robotics

Robots, Code, and the Future: What Robotics Really Means

Imagine a robot that explores the deep ocean, cleans your room, or even performs surgery! Robotics is the exciting field where engineering, computer science, and technology come together to design and build machines that can do tasks on their own. Robots are machines that can take over jobs that are boring, dangerous, or hard for people. Robotics combines many different skills including mechanical design, electrical systems, programming, and problem-solving to create helpful machines.



This robot dog uses sensors and actuators to move and explore, just like a real pet — but powered by code!

decides what the robot should do next. It follows step-by-step instructions called algorithms—like a recipe for robots—that tell the robot how to respond to different situations.

Actuators: These are the robot’s “muscles.” Actuators create movement by turning energy into motion. Motors, hydraulic systems, and pneumatic systems are all types of actuators that help robots move their parts.

Types of Robots in Our World

Robots come in many shapes and sizes, each designed for specific tasks:

How Robots Work

Unlike regular machines, robots have special features that make them unique. Most robots have three important parts that work together:

Sensors: These are like the robot’s “senses.” Sensors collect information from the environment, similar to how your eyes see and your ears hear. Common sensors detect light, sound, touch, or distance.

Processors: This is the robot’s “brain.” The processor is a computer that takes information from the sensors and

Industrial Robots: These powerful robots work in factories building cars, packing products, or assembling electronics. They can work non-stop and perform the same task repeatedly with perfect precision.

Service Robots: These helpful robots assist humans in daily life. Examples include robot vacuum cleaners, lawn mowers, and even robots that deliver food in hospitals or restaurants.

Educational Robots: These are the robots you might use in your classroom! They are designed to help you learn

programming, engineering, and problem-solving skills through hands-on activities.

Research Robots: Scientists use these advanced robots to explore places humans cannot easily go, like the deep ocean, other planets, or disaster areas.

Programming: Giving Robots Instructions

Robots cannot think for themselves. They need precise instructions to follow. Programming is how we give robots these instructions. When you program a robot, you create a set of step-by-step directions that tell it exactly what to do in different situations.

Modern programming for beginners often uses block-based coding, where you drag and drop visual blocks to create instructions. This makes it easier to understand programming concepts before learning text-based programming languages like Python or C++.

Common Misconceptions About Robotics

Myth: Robots look and act just like people.

Fact: Most robots don't look like humans at all. They're designed to fit the job—not to walk or talk like us. While some robots might look human-like, called humanoid robots, most have designs based on their function rather than human appearance.

Myth: Robots will replace all human jobs.

Fact: While robots are good at repetitive or dangerous tasks, they lack human creativity, judgment, and adaptability. Robots are tools that work alongside humans, helping us do things better or safer.

Robotics in Your Future

Robotics technology continues to advance rapidly. In your lifetime, you will see robots become more common in everyday life. Whether you build robots, code them, or just use them, robotics will be a big part of your future. Learning about it now gives you a head start on the world of tomorrow.



Learning to program robots lets you control how machines think, move, and solve problems — like building your own digital teammate.

The skills you learn in robotics—programming, problem-solving, critical thinking, and teamwork—are valuable in many careers, even those not directly related to robots. By studying robotics, you are preparing yourself for a technology-rich future where these skills will be increasingly important.

Amazing Robot Facts

- The word “robot” comes from the Czech word “robota,” which means forced labor or work.
- Some tiny medical robots are smaller than a grain of rice and can travel through your bloodstream.
- The Mars rover Perseverance can make oxygen from the Martian atmosphere while exploring the red planet.

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GUIDED NOTES

Key Terms

Define the following terms in your own words:

1. Robotics: _____
2. Sensors: _____
3. Processors: _____
4. Actuators: _____
5. Algorithms: _____

Main Concept Overview

Complete the sentences below using words from the word bank:

Word Bank: programming, energy, instructions, sensors, specialized

1. Robots gather information about their surroundings using _____.
2. Most robots are _____ machines designed for specific tasks rather than looking like humans.
3. Actuators help robots move by turning _____ into motion.
4. _____ is how we give robots specific directions to follow.
5. Robots follow step-by-step _____ called algorithms to decide what to do next.

Matching Section

Match each term with its correct description:

- | | |
|-----------------------------|--|
| _____ 1. Industrial Robots | A. Help you learn programming and engineering skills |
| _____ 2. Service Robots | B. Explore places humans cannot easily go |
| _____ 3. Educational Robots | C. Work in factories building products |
| _____ 4. Research Robots | D. System that converts one form of energy to motion |
| _____ 5. Actuator | E. Assist humans in daily life tasks |

True/False Questions

Mark each statement as True (T) or False (F):

- ☐ 1. Most robots look like humans.
- ☐ 2. The processor acts as the “brain” of a robot.
- ☐ 3. Robots can think for themselves without human programming.
- ☐ 4. Block-based coding is often used to introduce beginners to programming.
- ☐ 5. Robotics skills are only useful if you want to become a robotics engineer.

Fill in the Table

Complete the table about robot components and their functions:

Robot Component	What It Does
Sensors	
Processors	
Actuators	
Programming	

Critical Thinking Questions

1. Why are most robots designed based on their function rather than to look like humans? Explain using examples from the article.

2. How might learning robotics now help you in the future, even if you don’t become a robotics engineer?

1 | What Is Robotics? - Reflection Questions

#1

What robot have you seen or used in real life that impressed you the most?

Think about what sensors, processors, and actuators might be inside that robot to make it work.

#2

If you could design your own robot to help with one problem in your daily life, what would it do?

Consider what simple tasks you find boring or difficult that a robot might be able to handle.

#3

Which of the robot types mentioned in the article (industrial, service, educational, or research) interests you the most and why?

Think about which type seems most useful or exciting to you personally.

#4

How might robots change your future classroom or school?

Consider both positive changes robots could bring and any challenges that might come with using robots at school.

#5

What skills from the article do you think you're already good at (programming, problem-solving, critical thinking, or teamwork)?

How could these skills help you learn about robots?

#6

How do you feel about robots becoming more common in everyday life?

Think about whether this makes you excited, nervous, or curious, and explain your feelings.

1 | What Is Robotics? - Hypotheticals

Scenario: Designing a Home Robot

Your family wants to create a simple robot that can help around your house with one specific task that you currently find annoying or boring.

A. What household task would you want your robot to perform?

B. What basic components (sensors, processor, actuators) would your robot need?

C. How would you program your robot to know when its job is complete?

Scenario: Robots in Extreme Environments

NASA wants to send a robot to explore a new planet with extreme temperatures, rough terrain, and unknown obstacles.

A. Why would NASA send a robot instead of humans for this exploration?

B. What special features would this robot need to survive in harsh conditions?

C. How could the robot be programmed to make basic decisions when communication with Earth is delayed?

TERM	DEFINITION
Actuators	
Algorithms	
Educational Robots	
Humanoid	
Industrial Robots	
Processors	
Programming	
Research Robots	
Robotics	
Sensors	

1: WORD SEARCH

What Is Robotics?

S L E C H F P W X N G U Z I Q M Z Y G Q G S V B
I N D U S T R I A L R O B O T S I L R X J Z C V
N B U F W R N A A N Q D F J V U I S S W O V H L
O Z C M D G C L T N P S O Q X J Z W F Q Y K L R
N K A S W G Y S A U M M F B C E I W C W U Y Q Z
C P T U H L I R W I D V G Y P R O C E S S O R S
W V I J R D V J E D V O N H W X F F L R E J N R
M B O A D G Y N T S U O J N D R H Q I C A P N X
Q I N W O X R K J R E F I D V F E I Z A L O U Z
S F A S O A Y N S B N A B X F G E E S C L H U I
Z I L E T F N H B P T C R R O B O T I C S N S Q
Z S R T F Q N E Q B L W X C N C O P F M Z E N U
V K O D I H A E G Q O A C C H A I R A M S I U S
O K B A I G U G S Y G O C W V R W Q Y O Q E M L
M Z O J V T H O J R A H H T K B O J U O D W I M
H T T V Q S X G W P T M U P U S S B N P K T D L
Q Z S Z W H L G I H U X M K S A V O O L E Q V T
D J H G Z H Y O L G K A A U E O T B F T G K E X
D Q F O G K M I K Y G K N D N G W O D W S O T K
A U A L G O R I T H M S O N S D J H R A R T J V
L I N H Y N J W D L D M I Y O V E K M S D S B X
C C W G L P Y M L C U S D H R R K L H C A N S L
J W P Z I H N P H L Z N Y T S A V H D W L R Q L
H C R T B D R N R A P D P R O G R A M M I N G E

Research Robots

Industrial Robots

Educational Robots

Sensors

Robotics

Programming

Processors

Humanoid

Algorithms

Actuators

What Is Robotics?

Across

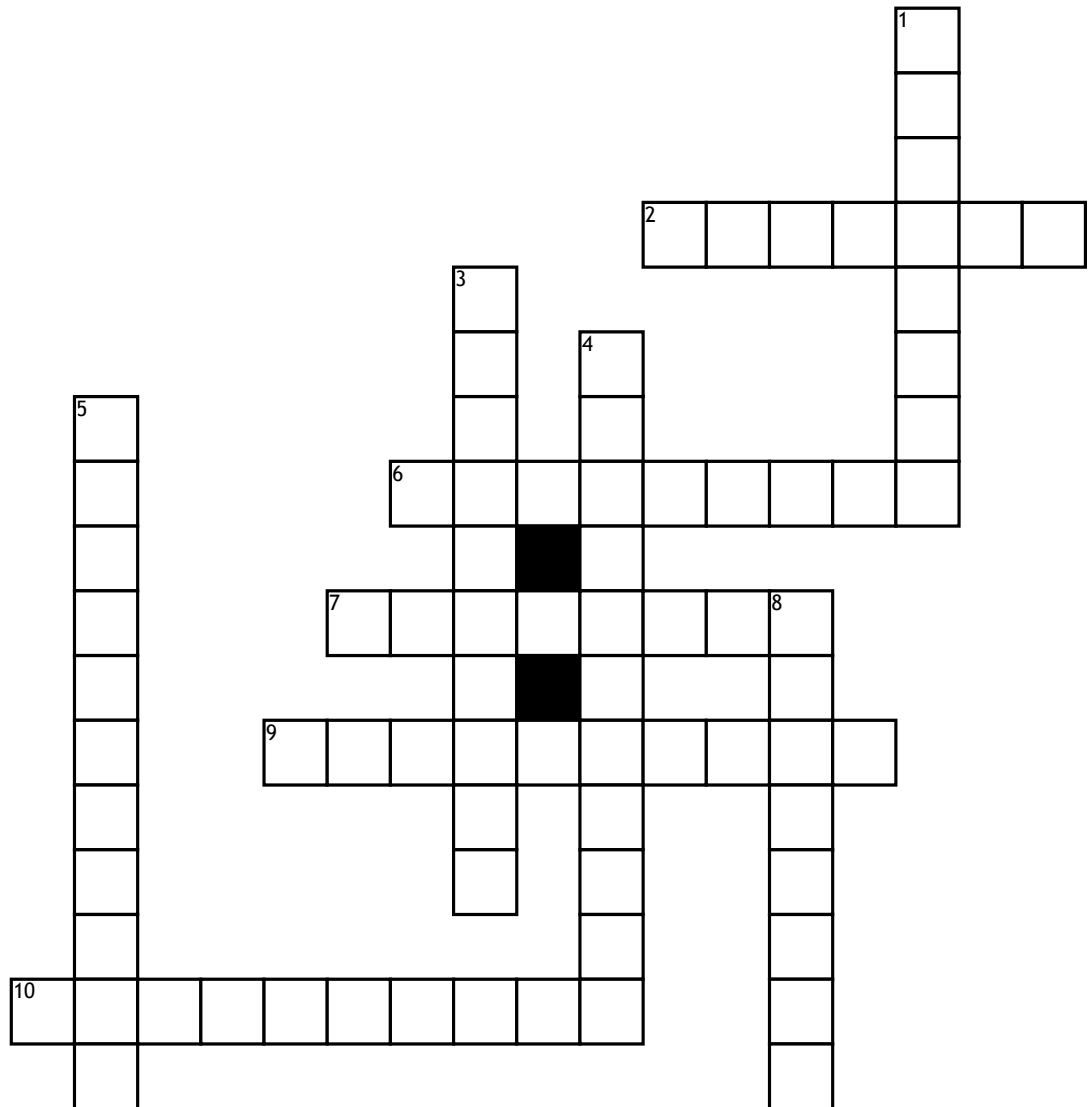
2. Parts of a robot that collect information from the environment, similar to how human eyes see and ears hear.

6. The "muscles" of a robot that create movement by turning energy into motion, such as motors and hydraulic systems.

7. Advanced robots used by scientists to explore places humans cannot easily go, like deep ocean, other planets, or disaster areas. ____ Robots

9. Step-by-step instructions, similar to a recipe, that tell a robot exactly how to respond in different situations.

10. Powerful robots that work in factories building cars, packing products, or assembling electronics with precision. ____ Robots



Down

1. The field where engineering, computer science, and technology combine to design and build machines that can do tasks on their own.

3. The "brain" of a robot that takes information from sensors and decides what the robot should do next.

4. Robots designed to help students learn programming, engineering, and problem-solving skills through hands-on activities. ____ Robotos

5. The process of giving robots precise instructions to follow by creating step-by-step directions for different situations.

8. A type of robot designed to look and move like a human, though most robots have designs based on their function rather than human appearance.