**What Is Robotics?**

Robotics is the intersection of science, engineering and technology that produces machines, called robots, that substitute for (or replicate) human actions. Pop culture has always been fascinated with robots. R2-D2. Optimus Prime. WALL-E. These over-exaggerated, humanoid concepts of robots usually seem like a caricature of the real thing...or are they more forward thinking than we realize? Robots are gaining intellectual and mechanical capabilities that don’t put the possibility of a R2-D2-like machine out of reach in the future.

**WHAT IS A ROBOT?**

A robot is the product of the robotics field, where programmable machines are built that can assist humans or mimic human actions. Robots were originally built to handle monotonous tasks (like building cars on an assembly line), but have since expanded well beyond their initial uses to perform tasks like fighting fires, cleaning homes and assisting with incredibly intricate surgeries. Each robot has a differing level of autonomy, ranging from human-controlled bots that carry out tasks that a human has full control over to fully-autonomous bots that perform tasks without any external influences.

As technology progresses, so too does the scope of what is considered robotics. In 2005, [90% of all robots could be found assembling cars](https://builtin.com/robotics/automotive-cars-manufacturing-assembly) in automotive factories. These robots consist mainly of mechanical arms tasked with welding or screwing on certain parts of a car. Today, we’re seeing an evolved and expanded definition of robotics that includes the development, creation and use of [bots that explore Earth’s harshest conditions](https://builtin.com/robotics/underwater-robots-explore-antarctic-ice-shelf), [robots that assist law-enforcement](https://builtin.com/robotics/police-robot-law-enforcement) and even [robots that assist in almost every facet of healthcare](https://builtin.com/robotics/surgical-medical-healthcare-robotics-companies).

While the overall world of robotics is expanding, a robot has some consistent characteristics:

1. Robots all consist of some sort of mechanical construction. The mechanical aspect of a robot helps it complete tasks in the environment for which it’s designed. For example, the [Mars 2020 Rover’s wheels](https://mars.nasa.gov/mars2020/mission/rover/wheels/) are individually motorized and made of titanium tubing that help it firmly grip the harsh terrain of the red planet.
2. Robots need electrical components that control and power the machinery. Essentially, an electric current (a battery, for example) is needed to power a large majority of robots.
3. Robots contain at least some level of computer programming. Without a set of code telling it what to do, a robot would just be another piece of simple machinery. Inserting a program into a robot gives it the ability to know when and how to carry out a task.

We’re really bound to see the promise of the robotics industry sooner, rather than later, as [artificial intelligence](https://builtin.com/artificial-intelligence) and [software](https://builtin.com/software-engineering-perspectives) also continue to progress. In the near future, thanks to advances in these technologies, [robots will continue getting smarter](https://ifr.org/ifr-press-releases/news/top-5-robot-trends-2021), more flexible and more energy efficient. They’ll also continue to be a main focal point in smart factories, where they’ll take on more difficult challenges and help to secure global supply chains.

Though relatively young, the robotics industry is filled with an admirable promise of progress that science fiction could once only dream about. From the deepest depths of our oceans to thousands of miles in outer space, robots will be found performing tasks that humans couldn’t dream of achieving alone.

* [26 Robotics Companies Changing The Way We Live And Work](https://builtin.com/robotics/robotics-companies-roundup)
* [How 12 Companies Are Using Artificial Intelligence To Make Smarter Robots](https://builtin.com/artificial-intelligence/robotics-ai-companies)

## ****Types of Robots****

Mechanical bots come in all shapes and sizes to efficiently carry out the task for which they are designed. All robots vary in design, functionality and degree of autonomy. From the 0.2 millimeter-long “RoboBee” to the 200 meter-long robotic shipping vessel “Vindskip,” robots are emerging to carry out tasks that humans simply can’t. **Generally, there are five types of robots:**

### **1) Pre-Programmed Robots**

Pre-programmed robots operate in a controlled environment where they do simple, monotonous tasks. An example of a pre-programmed robot would be a mechanical arm on an automotive assembly line. The arm serves one function — to weld a door on, to insert a certain part into the engine, etc. — and its job is to perform that task longer, faster and more efficiently than a human.

### **2) Humanoid Robots**

Humanoid robots are robots that look like and/or mimic human behavior. These robots usually perform human-like activities (like running, jumping and carrying objects), and are sometimes designed to look like us, even having human faces and expressions. Two of the most prominent examples of humanoid robots are [Hanson Robotics’ Sophia](https://www.hansonrobotics.com/sophia/) (in the video above) and Boston Dynamics’ [Atlas](https://www.bostondynamics.com/atlas).

### **3) Autonomous Robots**

Autonomous robots operate independently of human operators. These robots are usually designed to carry out tasks in open environments that do not require human supervision. They are quite unique because they use sensors to perceive the world around them, and then employ decision-making structures (usually a computer) to take the optimal next step based on their data and mission. An example of an autonomous robot would be the Roomba vacuum cleaner, which uses sensors to roam freely throughout a home.

## EXAMPLES OF AUTONOMOUS ROBOTS

* Cleaning Bots (for example, Roomba)
* Lawn Trimming Bots
* Hospitality Bots
* Autonomous Drones
* Medical Assistant Bots

### **4) Teleoperated Robots**

Teleoperated robots are semi-autonomous bots that use a wireless network to enable human control from a safe distance. These robots usually work in extreme geographical conditions, weather, circumstances, etc. Examples of teleoperated robots are the human-controlled submarines used to fix underwater pipe leaks during the BP oil spill or [drones used to detect landmines](https://builtin.com/robotics/landmine-detecting-drones-could-help-save-lives) on a battlefield.

### **5) Augmenting Robots**

Augmenting robots either enhance current human capabilities or replace the capabilities a human may have lost. The field of robotics for human augmentation is a field where science fiction could become reality very soon, with bots that have the ability to redefine the definition of humanity by making humans faster and stronger. Some examples of current augmenting robots are robotic prosthetic limbs or exoskeletons used to lift hefty weights.

* [From Diffusing Bombs to Performing Surgery, VR Robots Have Some Amazing Uses](https://builtin.com/robotics/vr-robots)

### Is robot software considered robotics?

A software robot is an abundant type of computer program which carries out tasks autonomously, such as a chatbot or a web crawler. However, because software robots only exist on the internet and originate within a computer, they are not considered robots. In order to be considered a robot, a device must have a physical form, such as a body or a chassis.