

## ROBOTS

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A **robot** is a mechanical or virtual intelligent agent that can perform tasks automatically or with guidance, typically by remote control. In practice a robot is usually an electro-mechanical machine that is guided by computer and electronic programming. Robots can be autonomous, semi-autonomous or remotely controlled. Robots range from humanoids such as ASIMO and TOPIO to Nano robots, Swarm robots, Industrial robots, military robots, mobile and servicing robots. By mimicking a lifelike appearance or automating movements, a robot may convey a sense that it has intent or agency of its own. The branch of technology that deals with robots is robotics.

Mobile robots have the capability to move around in their environment and are not fixed to one physical location. An example of a mobile robot that is in common use today is the *automated guided vehicle* or *automatic guided vehicle* (AGV). An AGV is a mobile robot that follows markers or wires in the floor, or uses vision or lasers. AGVs are discussed later in this article.

Mobile robots are also found in industry, military and security environments. They also appear as consumer products, for entertainment or to perform certain tasks like vacuum cleaning. Mobile robots are the focus of a great deal of current research and almost every major university has one or more labs that focus on mobile robot research.

Modern robots are usually used in tightly controlled environments such as on assembly lines because they have difficulty responding to unexpected interference. Because of this most humans rarely encounter robots. However domestic robots for cleaning and maintenance are increasingly common in and around homes in developed countries. Robots can also be found in military applications.

Most commonly industrial robots are fixed robotic arms and manipulators used primarily for production and distribution of goods. The term "service robot" is less well-defined. IFR has proposed a tentative definition, "A service robot is a robot which operates semi- or fully autonomously to perform services useful to the well-being of humans and equipment, excluding manufacturing operations."

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Industrial robots usually consist of a jointed arm (multi-linked manipulator) and an end effector that is attached to a fixed surface. One of the most common type of end effector is a gripper assembly.

The International Organization for Standardization gives a definition of a manipulating industrial robot in ISO 8373: "an automatically controlled, reprogrammable, multipurpose, manipulator programmable in three or more axes, which may be either fixed in place or mobile for use in industrial automation applications."

This definition is used by the International Federation of Robotics, the European Robotics Research Network (EURON) and many national standards committees.

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Modular robots is a new breed of robots that are designed to increase the utilization of the robots by modularizing the robots. The functionality and effectiveness of a modular robot is easier to increase compared to conventional robots.

Some experts and academics have questioned the use of robots for military combat, especially when such robots are given some degree of autonomous functions. There are also concerns about technology which might allow some armed robots to be controlled mainly by other robots. The US Navy has funded a report which indicates that as military robots become more complex, there should be greater attention to implications of their ability to make autonomous decisions. One researcher states that autonomous robots might be more humane, as they could make decisions more effectively. However, other experts question this.

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