

Humanoid Robots

Session Organizers:

Cynthia Breazeal, *Massachusetts Institute of Technology*, and Satoshi Iwaki,
NTT Cyber Solution Laboratories

This session highlights recent advances in the development of humanoid robots.

Although the most familiar humanoid robots come from science fiction, such as Japan's Atom Boy or Star Wars' C-3PO, the idea of creating humanoid robots has amused and fascinated us for thousands of years.

Throughout history, humans have sought to build artifacts that mimic our appearance and movement, as well as our cognitive and adaptive processes. As far back as the ancient Greeks, the idea of humanoid machines appears in Homer's Iliad where Hephaistos, the god of metal smiths, fashions mechanical helpers--strong, vocal, and intelligent maidens of gold. The idea surfaces again in medieval times in the Jewish legend of the Golem, a robot-like servant made of clay brought to life by Rabbi Loew of Prague. As technology advanced, people began to actually build such machines. There is evidence that as early as c. 1478, a young Leonardo Da Vinci, conceptualized a humanoid automaton, controllable by a very crude but programmable analog computer composed of cogs and pulleys. The year 1946 marks the invention the ENIAC computer, the first large-scale general-purpose electronic digital computer. Just a few years later (1950) the famous British mathematician, Alan Turing, wrote a provocative paper called "Computing Machinery and Intelligence" where he discusses the possibility of building machines that can think and learn, and outlines a test (the "imitation game" later known as the Turing Test) to determine if a machine can think. A visionary Walt Disney applied robotic technology to entertainment purposes for their earliest physically animated performers, such as the famous Abraham Lincoln audio-animatronic that debuted at the 1964-65 New York World's Fair.

With each technological advance in sensing, actuation, power, computation, materials, etc. allows us to develop the next generation humanoid machine.

Today, we are able to create autonomous humanoid robots that can perceive the world around them, walk and manipulate objects, make their own decisions for how to interact with the world and people around them, and even learn new skills from human demonstration.

The speakers in this session present their recent research in developing humanoid robots with a broad range of capabilities. This work is not only motivated by the engineering dream of developing a robot with human-like capabilities, but also a scientific desire to learn about ourselves through the process of creating such machines. Today humanoid robots fascinate and entertain us. Tomorrow they may assist us in our daily lives.