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# Robotics timeline

**3500 B.C.E.** The Greek myths of Hephaestus and Pygmalion incorporate the idea of intelligent mechanisms.

**2500 B.C.E.** The Egyptians invent the idea of thinking "machines": their advice-giving oracles are statues with priests hidden inside.

**1400 B.C.E.** The Babylonians develop the water clock, considered one of the first robotic devices.

**800 B.C.E.** Automata appear in Homer's *Iliad*.

**400 B.C.E.** Chinese engineer King-Shu Tse designs a mechanical bird and horse.

**350 B.C.E.** Greek mathematician Archytas of Tarentum constructs a mechanical wooden bird whose movements are controlled by a jet of steam or compressed air.

**270 B.C.E.** Greek inventor and physicist Ctesibus of Alexandria designs water clocks with movable figures.

**200 B.C.E.** Chinese artisans develop elaborate automata.

**100 C.E.** Egyptian inventor Hero of Alexandria designs various automata for theater and temple use and details the workings of his automatic devices in his work *Automata.*

**725** Chinese engineer Liang Lingzan and Buddhist monk Yi Xing build a water-driven device with the world's first clockwork escapement mechanism – the first true mechanical clock.

**1206** Arabic engineer Al-Jazari writes *The book of knowledge of ingenious mechanical devices*, which describes in detail fifty devices, including an automated girl who poured drinks and a "robot band" of four automated musicians.

**1400** Automated carillons appear in the Netherlands.

**1495** Italian artist and inventor Leonardo da Vinci designs an artificial man in the form of an armored Germanic knight, the first humanoid robot in Western civilization.

**1525** German scholar Hans Bullmann designs and builds humanoid androids who play musical instruments.

**1580** Czech Rabbi Judah Loew of Prague is said to have brought to life a clay man known as the Golem to defend the Jews of Prague from anti-Semitic attacks.

**1700** Mechanized puppets known as "Karakuri Ningyo" appear in Japan, typically designed to perform a single task such as serving tea or writing calligraphy.

**1725** A mechanical theatre featuring 119 animated figures that perform a play to the accompaniment of a water-powered organ is built at the Heilbrunn chateau in Germany.

**1727** German philosopher and alchemist Albertus Magnus coins the word "android."

**1737** French inventor Jacques Vaucanson creates several robotic beings, including a human-sized android flutist and an automatic duck that simulates quacking, drinking, eating, paddling in water, digesting and excreting.

**1760** German inventor Friedrich von Knauss creates an android able to hold a pen and write a piece of up to 107 words.

**1773** Swiss inventors Pierre and Henry Louis Jaquet-Droz create various automatons, including one that draws four pre-programmed pictures.

**1801** French inventor Joseph Jacquard builds an automated loom that is controlled with punch cards.

**1818** English author Mary Shelley writes *Frankenstein*, about an artificial man created by Dr. Frankenstein.

**1822** English mathematician Charles Babbage demonstrates a prototype of his "Difference Engine" to the Royal Astronomical Society.

**1833** Charles Babbage begins work on his "Analytical Engine", one of the first computational machines.

**1847** English mathematician George Boole invents a symbolic logic (now called Boolean logic) that would become basic to the design of digital computer circuits.

**1888** Serbian-American inventor Nikola Tesla develops the first alternating-current induction motor.

**1890** Nikola Tesla creates the first remote-controlled vehicles.

**1892** American engineer Seward Babbitt designs a motorized (but not robotic) crane to remove ingots from a furnace.

**1921** Czech author Karel Capek coins the word "robot" to describe mechanical people in his play "R.U.R" (Rossum's Universal Robots).

**1926** The film *Metropolis* features the first movie robot, "Maria."

**1936** British mathematician and computer scientist Alan Turing completes his seminal paper *On Computable Numbers* and introduces the concept of a theoretical computer called the Turing Machine.

**1938** American engineers Willard Pollard and Harold Roselund design a programmable paint-spraying mechanism.

**1939** Elektro, a 7-foot-tall, 260-pound mechanical man built by Westinghouse, appears at the New York World's Fair. ELEKTRO walks, talks and smokes.

**1942** American author Isaac Asimov popularizes the term "robotics" and sets out his "three laws of robotics" in his story "Runaround."

American physicists John Vincent Atanasoff and Clifford Berry design the Atanasoff Berry Computer (ABC), the first electronic digital computer to perform numerical calculations digitally.

**1943** American scientists Warren McCulloch and Walter Pitts do pioneering work on neural networks.

**1943** Colossus, the world's first large-scale programmable electronic digital computer, is built in Britain by a team of mathematicians, electrical engineers and intelligence agents to crack Nazi codes.

**1945** American physicist John Mauchly and American engineer J. Presper Eckert create ENIAC (Electronic Numerical Integrator And Computer), the first American electronic digital computer, to run ballistics calculations for the United States Army.

**1946** American engineer George Devol patents a playback device for controlling machines, using magnetic recording.

Whirlwind, the first general-purpose digital computer able to operate in real time, solves its first problem at MIT.

**1948** MIT professor Norbert Wiener publishes *Cybernetics or Control and Communication in the Animal*, a book which describes the concept of communications and control in electronic, mechanical and biological systems.

British roboticist William Grey Walter creates autonomous machines called Elmer and Elsie that mimic lifelike behavior with very simple circuitry.

**1950** Alan Turing proposes a test to determine whether or not a machine has gained the power to think for itself. It becomes known as the "Turing Test".

1951 American engineer Raymond Goertz designs the ElectroMechanical Manipulator, the first remotely-controlled articulated arm, for the Atomic Energy Commission.

UNIVAC (Universal Automatic Computer), the world's first commercially available computer, is designed by ENIAC creators Eckert and Mauchly. The first UNIVAC came online for the U.S. Government's Census Bureau. The first commercial customer to purchase a UNIVAC was the Prudential Insurance Company.

1952 The first NC (numerically controlled) machine is built at MIT.

1954 American engineers George Devol and Joe Engleberger design the first programmable robot "arm," the world's first industrial robot.

1956 American researchers Allen Newell, Herbert Simon and John Shaw create the Logic Theorist, the first artificial intelligence program.

George Devol and Joseph Engelberger form the world's first robot company: Unimation, Inc.

1957 The Servomechanisms Laboratory at MIT demonstrates one of the first practical applications of computer-assisted manufacturing.

1959 Researchers John McCarthy and Marvin Minsky start the Artificial Intelligence Laboratory at MIT.

1960 Unimation is purchased by Condec Corporation and the development of Unimate Robot Systems begins.

American Machine and Foundry, later known as AMF Corporation, markets the first cylindrical robot, called the Versatran.

1961 MIT researcher Heinrich Ernst develops the MH-1, a computer-operated mechanical hand.

1962 The first Unimate robot is installed in a General Motors plant in Trenton, New Jersey. The assembly line spot welding robot is controlled step-by-step by commands stored on a magnetic drum.

**1963** The first computer-controlled robotic arm is designed at Rancho Los Amigos Hospital in Downey, California as a tool for the handicapped.

**1964** Artificial intelligence research laboratories are opened at MIT, Stanford Research Institute (SRI), Stanford University and the University of Edinburgh.

**1965** Carnegie Mellon University establishes the Robotics Institute.

Stanford University researchers Edward Feigenbaum and Joshua Lederberg create DENDRAL, the first expert system designed to execute the accumulated knowledge of subject experts.

**1966** An artificial intelligence program named ELIZA is created at MIT by Joseph Weizenbaum. ELIZA functions as a computer "psychologist" that manipulates its users' statements to form questions.

The Stanford Research Institute creates Shakey, the first mobile robot that can reason about its surroundings.

**1967** MIT researcher Richard Greenblatt writes MacHack, the first chess program to win against a person in a chess tournament.

The first robot - an AMF Versatran - is imported into Japan.

**1968** Marvin Minsky develops a computer-controlled, hydraulic-powered, wall-mounted tentacle arm.

**1969** The Japanese company Kawasaki develops the Kawasaki-Unimate 2000, the first industrial robot ever produced in Japan, with technology licensed from Unimation.

Stanford Artificial Intelligence Lab researcher Victor Scheinman creates the Stanford Arm, the first successful electrically powered, computer-controlled robot arm.

**1973** Cincinnati Milacron Corporation releases the T3, (The Tomorrow Tool) the first commercially available minicomputer-controlled industrial robot.

Wabot 1, the world's first full-scale anthropomorphic robot, is built at Waseda University in Japan. It is able to communicate in Japanese, walk and grip objects with its hands.

**1975** Victor Scheinman develops the Programmable Universal Manipulation Arm, which becomes widely used in industry.

Japanese engineer Shigeo Hirose designs the Soft Gripper, designed to wrap around an object in snake-like fashion, at the Tokyo Institute of Technology.

Robot arms are used on the Viking 1 and 2 space probes.

The film *Star Wars* features "droids" R2-D2 and C-3PO.

**1978** Unimation develops the PUMA (Programmable Universal Machine for Assembly), based on Victor Scheinman's design.

**1979** Austrian researcher Hans Moravec creates the Stanford Cart, an autonomous vehicle that can navigate across a room full of obstacles.

**1982** The film Blade Runner features androids that are "more human than human."

**1984** American AI researcher Douglas Lenat initiates the EnCYClopedia project to create a database of common sense to help robots understand our world.

**1985** The PUMA 560 robotic surgical arm is used in the first documented use of a robot-assisted surgical procedure.

Two remotely-operated robots built by American roboticist William "Red" Whittaker are sent into the flooded basement of the damaged reactor building following the meltdown at the Three Mile Island nuclear power plant. The Remote Reconnaissance Vehicle and the Core Sampler surveyed the site, sent back information and drilled core samples to measure radiation levels. The two robots worked for four years inside the reactor building and remain there to this day.

**1986** LEGO collaborates with the MIT Media Lab to bring the first LEGO-based educational products to market.

**1989** The Mobile Robots Group at MIT creates a walking robot named Genghis.

MIT researchers Rodney Brooks and A. M. Flynn publish the paper "Fast, Cheap and Out of Control: A Robot Invasion of the Solar System," which makes the case for building many small, cheap robots rather than few big, expensive ones.

**1992** American neurosurgeon John Adler invents the CyberKnife, a robot that images a patient and delivers a pre-planned dose of radiation.

**1993** American designer Marc Thorpe founds Robot Wars, an event in which radio-controlled robots compete in live, gladiator-style events.

Seiko Epson develops Monsieur, an ultra-miniature, self-propelled mobile robot, the world's smallest micro robot.

**1994** Carnegie Mellon University Robotics Institute's Dante II robot descends into the crater of the Mount Spurr volcano in Alaska to sample volcanic gases.

**1995** The unmanned Predator drone is developed by General Atomics.

**1996** MIT researchers Michael S. Triantafyllou and David Barrett develop a robo-tuna.

Honda creates the P-2 (Prototype 2), a humanoid robot that can walk, climb stairs and carry loads.

University of South Florida researchers Chris Campbell and Stuart Wilkinson create the Gastrobot, a robot that digests organic mass to produce carbon dioxide that is then used for power.

**1997** The Pathfinder Mission lands on Mars. Its free-ranging robotic rover Sojourner, returns 2.3 billion bits of information, including more than 17,000 images, more than 15 chemical analyses of rocks and soil and extensive data on winds and other weather factors.

**1998** Tiger Electronics introduces the Furby, an "animatronic pet" that can react to its environment and communicate in English and "Furbish".

LEGO releases their first Robotics Invention System, MINDSTORMS.

Scotsman Campbell Aird is fitted with the world's first bionic arm.

NASA launches the Deep Space 1 autonomous spacecraft to test technologies to be used in future missions crewed and conducted solely by robots.

**1999** Sony releases the Aibo electronic dog robot, which reacts to sounds and has some preprogrammed behavior.

Probotics, Inc. releases the Cye personal robot that can be used to perform a variety of household chores.

**2000** Honda releases ASIMO, the next generation of its series of humanoid robots.

The United Nations estimates that there are 742,500 industrial robots in use worldwide.

Sony unveils the humanoid Sony Dream Robot.

Italian computational neurobiologist Sandro Mussa-Ivaldi of Northwestern University hooks up a lamprey brain to sensors in order to control a robot.

The da Vinci Surgery System becomes the first robotic surgery system approved by the FDA.

**2001** The Space Station Remote Manipulator System (SSRMS) is successfully launched into orbit and begins operations to complete assembly of the International Space Station.

The Global Hawk robotic spy plane charts its own course for 8,000 miles.

The iRobot PackBot is used to search the World Trade Center site after the September 11 terrorist attacks.

**2002** iRobot releases the Roomba autonomous robot vacuum.

British cybernetics professor Kevin Warwick becomes the first cyborg in the world by controlling electronic devices with his nervous system through an 100-electrodes array implanted into his arm.

**2005** A team of researchers at Cornell University builds the first self-replicating robot.

Boston Dynamics unveils Big Dog, a dynamically stable quadruped robot. Big Dog can traverse difficult terrain, climb a 35-degree incline and run at 4 miles an hour while carrying 340 pounds.

**2011** Robonaut 2, a human-like robotic assistant developed jointly by NASA and General Motors, is launched into space on space shuttle Discovery as part of the STS-133 mission to become permanent resident of the International Space Station.

NASA launches the Mars Science Laboratory Curiosity rover, which will assess the planet's "habitability." It remains in operation today.

**2012** The first driverless car is licensed in Nevada.

**2014** hitchBOT, a robot created by a team of Canadian researchers, "hitchhikes" across Canada and Europe on a mission to explore cultural attitudes toward social robotics. hitchBOT is destroyed in Philadelphia in 2015.

**Sources**: BBC, NASA, the History of Computing Project, history-computer.com, Into Robotics, roboticoncology.com, the Tech Museum of Innovation, World History Encyclopedia