

# A Very Short History Of Artificial Intelligence (AI)

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1308

Catalan poet and theologian [Ramon Llull](#) publishes *Ars generalis ultima* (The Ultimate General Art), further perfecting his method of using paper-based mechanical means to **create new knowledge from combinations of concepts**.

1666

Mathematician and philosopher Gottfried Leibniz publishes [Dissertatio de arte combinatoria](#) (On the Combinatorial Art), following Ramon Llull in **proposing an alphabet of human thought and arguing that all ideas are nothing but combinations of a relatively small number of simple concepts**.

1726 Jonathan Swift publishes *Gulliver's Travels*, which includes a description of [the Engine](#), a machine on the island of Laputa (and a parody of Llull's ideas): "a Project for improving speculative Knowledge by practical and mechanical Operations." By using this "Contrivance," "the most ignorant Person at a reasonable Charge, and with a little bodily Labour, may write Books in Philosophy, Poetry, Politicks, Law, Mathematicks, and Theology, with the least Assistance from Genius or study."

1763 Thomas Bayes develops a framework for reasoning about the probability of events. [Bayesian inference](#) will become a leading approach in machine learning.

1854 [George Boole](#) argues that logical reasoning could be performed systematically in the same manner as solving a system of equations.

1898 At an electrical exhibition in the recently completed Madison Square Garden, Nikola Tesla makes a demonstration of [the world's first radio-controlled vessel](#). The boat was equipped with, as Tesla described, "a borrowed mind."

1914 The Spanish engineer [Leonardo Torres y Quevedo](#) demonstrates the first chess-playing machine, capable of king and rook against king endgames without any human intervention.

1921 Czech writer Karel Čapek introduces the word "robot" in his play [R.U.R.](#) (Rossum's Universal Robots). The word "robot" comes from the word "robita" (work).

1925 Houdina Radio Control releases [a radio-controlled driverless car](#), travelling the streets of New York City.

1927 The science-fiction film [Metropolis](#) is released. It

features a robot double of a peasant girl, Maria, which unleashes chaos in Berlin of 2026—it was the first robot depicted on film, inspiring the Art Deco look of C-3PO in *Star Wars*.

1929 Makoto Nishimura designs [Gakutensoku](#), Japanese for "learning from the laws of nature," the first robot built in Japan. It could change its facial expression and move its head and hands via an air pressure mechanism.

1943 Warren S. McCulloch and Walter Pitts publish "[A Logical Calculus of the Ideas Immanent in Nervous Activity](#)" in the *Bulletin of Mathematical Biophysics*. This influential paper, in which they discussed networks of idealized and simplified artificial "neurons" and how they might perform simple logical functions, will become the inspiration for computer-based "neural networks" (and later "deep learning") and their popular description as "mimicking the brain."

1949 [Edmund Berkeley](#) publishes *Giant Brains: Or Machines That Think* in which he writes: "Recently there have been a good deal of news about strange giant machines that can handle information with vast speed and skill....These machines are similar to what a brain would be if it were made of hardware and wire instead of flesh and nerves... A machine can handle information; it can calculate, conclude, and choose; it can perform reasonable operations with information. A machine, therefore, can think."

1949 Donald Hebb publishes [Organization of Behavior: A Neuropsychological Theory](#) in which he proposes a theory about learning based on conjectures regarding neural networks and the ability of synapses to strengthen or weaken over time.

1950 Claude Shannon's "[Programming a Computer for Playing Chess](#)" is the first published article on developing a chess-playing computer program.

1950 Alan Turing publishes "[Computing Machinery and Intelligence](#)" in which he proposes "the imitation game" which will later become known as the "Turing Test."

1951 Marvin Minsky and Dean Edmunds build SNARC (Stochastic Neural Analog Reinforcement Calculator), the first artificial neural network, using 3000 vacuum tubes to simulate a network of 40 neurons.

1952 [Arthur Samuel](#) develops the first computer checkers-playing program and the first computer program to learn on its own.

August 31, 1955 The term "[artificial intelligence](#)" is coined in a [proposal](#) for a "2 month, 10 man study of artificial intelligence" submitted by John McCarthy (Dartmouth College), Marvin Minsky (Harvard University), Nathaniel Rochester (IBM), and Claude Shannon (Bell Telephone Laboratories). The workshop, which took place a year later, in July and August 1956, is generally considered as the official birthdate of the new field.

December 1955 Herbert Simon and Allen Newell develop the [Logic Theorist](#), the first artificial intelligence program, which eventually would prove 38 of the first 52 theorems in Whitehead and Russell's *Principia Mathematica*.

1957 [Frank Rosenblatt](#) develops the Perceptron, an early artificial neural network enabling pattern recognition based on a two-layer computer learning network. *The New York Times* reported the Perceptron to be "the embryo of an electronic computer that [the Navy] expects will be able to walk, talk, see, write, reproduce itself and be conscious of its existence." *The New Yorker* called it a "remarkable machine... capable of what amounts to thought."

1958 John McCarthy develops programming language [Lisp](#) which becomes the most popular programming language used in artificial intelligence research.

1959 Arthur Samuel coins the term "machine learning," [reporting](#) on programming a computer "so that it will learn to play a better game of checkers than can be played by the person who wrote the program."

1959 Oliver Selfridge publishes "[Pandemonium: A paradigm for learning](#)" in the *Proceedings of the Symposium on Mechanization of Thought Processes*, in which he describes a model for a process by which computers could recognize patterns that have not been specified in advance.

1959 John McCarthy publishes "[Programs with Common Sense](#)" in the *Proceedings of the Symposium on Mechanization of Thought Processes*, in which he describes the Advice Taker, a program for solving problems by manipulating sentences in formal languages with the ultimate objective of making programs "that learn from their experience as effectively as humans do."

1961 The first industrial robot, [Unimate](#), starts working on an assembly line in a General Motors plant in New Jersey.

1961 James Slagle develops [SAINT](#) (Symbolic Automatic INTEGRATOR), a heuristic program that solved symbolic integration problems in freshman calculus.

1964 Daniel Bobrow completes his MIT PhD dissertation titled "[Natural Language Input for a Computer Problem Solving System](#)" and develops STUDENT, a natural language understanding computer program.

- 1965                    [Herbert Simon](#) predicts that "machines will be capable, within twenty years, of doing any work a man can do."
- 1965                    [Hubert Dreyfus](#) publishes "Alchemy and AI," arguing that the mind is not like a computer and that there were limits beyond which AI would not progress.
- 1965                    [I.J. Good](#) writes in "Speculations Concerning the First Ultraintelligent Machine" that "the first ultraintelligent machine is the last invention that man need ever make, provided that the machine is docile enough to tell us how to keep it under control."
- 1965                    Joseph Weizenbaum develops [ELIZA](#), an interactive program that carries on a dialogue in English language on any topic. Weizenbaum, who wanted to demonstrate the superficiality of communication between man and machine, was surprised by the number of people who attributed human-like feelings to the computer program.
- 1965                    Edward Feigenbaum, Bruce G. Buchanan, Joshua Lederberg, and Carl Djerassi start working on [DENDRAL](#) at Stanford University. The first expert system, it automated the decision-making process and problem-solving behavior of organic chemists, with the [general aim of studying hypothesis formation](#) and constructing models of empirical induction in science.
- 1966                    Shakey the robot is the first general-purpose mobile robot to be able to reason about its own actions. In a [Life magazine 1970 article](#) about this "first electronic person," Marvin Minsky is quoted saying with "certitude": "In from three to eight years we will have a machine with the general intelligence of an average human being."
- 1968                    The film [2001: Space Odyssey](#) is released, featuring Hal, a sentient computer.

1968

Terry Winograd develops [SHRDLU](#), an early natural

language understanding computer program.

1969

Arthur Bryson and Yu-Chi Ho describe [backpropagation](#) as a multi-stage dynamic system optimization method. A learning algorithm for multi-layer artificial neural networks, it has contributed significantly to the success of deep learning in the 2000s and 2010s, once computing power has sufficiently advanced to accommodate the training of large networks.

1969

Marvin Minsky and Seymour Papert publish *Perceptrons: An Introduction to Computational Geometry*, highlighting the limitations of simple neural networks. In an expanded edition published in 1988, they responded to claims that their 1969 conclusions significantly reduced funding for neural network research: "Our version is that progress had already come to a virtual halt because of the lack of adequate basic theories... by the mid-1960s there had been a great many experiments with perceptrons, but no one had been able to explain why they were able to recognize certain kinds of patterns and not others."

1970

The first anthropomorphic robot, the [WABOT-1](#), is built at Waseda University in Japan. It consisted of a limb-control system, a vision system and a conversation system.

1972

[MYCIN](#), an early expert system for identifying bacteria causing severe infections and recommending antibiotics, is developed at Stanford University.

1973

[James Lighthill reports](#) to the British Science Research Council on the state artificial intelligence research, concluding that "in no part of the field have discoveries made so far produced the major impact that was then promised," leading to drastically reduced government support for AI research.

1976 Computer scientist [Raj Reddy](#) publishes "Speech Recognition by Machine: A Review" in the *Proceedings of the IEEE*, summarizing the early work on Natural Language Processing (NLP).

1978 The [XCON](#) (eXpert CONfigurer) program, a rule-based expert system assisting in the ordering of DEC's VAX computers by automatically selecting the components based on the customer's requirements, is developed at Carnegie Mellon University.

1979 [The Stanford Cart](#) successfully crosses a chair-filled room without human intervention in about five hours, becoming one of the earliest examples of an [autonomous vehicle](#).

1980 [Wabot-2](#) is built at Waseda University in Japan, a musician humanoid robot able to communicate with a person, read a musical score and play tunes of average difficulty on an electronic organ.

1981 The Japanese Ministry of International Trade and Industry budgets \$850 million for the [Fifth Generation Computer](#) project. The project aimed to develop computers that could carry on conversations, translate languages, interpret pictures, and reason like human beings.

1984 *Electric Dreams* is released, a film about a love triangle between a man, a woman and a personal computer.

1984 At the annual meeting of AAAI, Roger Schank and Marvin Minsky warn of the coming "[AI Winter](#)," predicting an imminent bursting of the AI bubble (which did happen three years later), similar to the reduction in AI investment and research funding in the mid-1970s.

1986 First driverless car, a Mercedes-Benz van equipped with cameras and sensors, built at Bundeswehr University in Munich under the direction of [Ernst Dickmanns](#), drives up to 55 mph on empty streets.

October 1986 David Rumelhart, Geoffrey Hinton, and Ronald

Williams publish "[Learning representations by back-propagating errors](#)," in which they describe "a new learning procedure, **back-propagation**, for networks of neurone-like units."

1987                   The video [Knowledge Navigator](#), accompanying Apple CEO John Sculley's keynote speech at Educom, envisions a future in which "knowledge applications would be accessed by smart agents working over networks connected to massive amounts of digitized information."

1988                   Judea Pearl publishes *Probabilistic Reasoning in Intelligent Systems*. His [2011 Turing Award](#) citation reads: "Judea Pearl created the representational and computational foundation for the processing of information under uncertainty. He is credited with the invention of Bayesian networks, a mathematical formalism for defining complex probability models, as well as the principal algorithms used for inference in these models. This work not only revolutionized the field of artificial intelligence but also became an important tool for many other branches of engineering and the natural sciences."

1988                   Rollo Carpenter develops the chat-bot [Jabberwacky](#) to "simulate natural human chat in an interesting, entertaining and humorous manner." It is an early attempt at creating artificial intelligence through human interaction.

1988                   Members of the IBM T.J. Watson Research Center publish "[A statistical approach to language translation](#)," heralding the shift from rule-based to probabilistic methods of machine translation, and reflecting a broader shift to "machine learning" based on statistical analysis of known examples, not comprehension and "understanding" of the task at hand (IBM's project Candide, successfully translating between English and French, was based on 2.2 million pairs of sentences, mostly from the bilingual proceedings of the Canadian parliament).

1988 Marvin Minsky and Seymour Papert publish an expanded edition of their 1969 book *Perceptrons*. In “Prologue: A View from 1988” they wrote: “One reason why progress has been so slow in this field is that researchers unfamiliar with its history have continued to make many of the same mistakes that others have made before them.”

1989 Yann LeCun and other researchers at AT&T Bell Labs successfully apply a backpropagation algorithm to a multi-layer neural network, recognizing handwritten ZIP codes. Given the hardware limitations at the time, it took about 3 days (still a significant improvement over earlier efforts) to train the network.

1990 Rodney Brooks publishes “[Elephants Don’t Play Chess](#),” proposing a new approach to AI—building intelligent systems, specifically robots, from the ground up and on the basis of ongoing physical interaction with the environment: “The world is its own best model... The trick is to sense it appropriately and often enough.”

1993 Vernor Vinge publishes “[The Coming Technological Singularity](#),” in which he predicts that “within thirty years, we will have the technological means to create superhuman intelligence. Shortly after, the human era will be ended.”

1995 Richard Wallace develops the chatbot [A.L.I.C.E](#) (Artificial Linguistic Internet Computer Entity), inspired by Joseph Weizenbaum's ELIZA program, but with the addition of natural language sample data collection on an unprecedented scale, enabled by the advent of the Web.

1997 Sepp Hochreiter and Jürgen Schmidhuber propose Long Short-Term Memory (LSTM), a type of a recurrent neural network used today in handwriting recognition and speech recognition.

1997 [Deep Blue](#) becomes the first computer chess-

playing program to beat a reigning world chess champion.

1998                   Dave Hampton and Caleb Chung create [Furby](#), the first domestic or pet robot.

1998                   Yann LeCun, Yoshua Bengio and others publish papers on the [application of neural networks to handwriting recognition](#) and on optimizing [backpropagation](#).

2000                   MIT's Cynthia Breazeal develops [Kismet](#), a robot that could [recognize and simulate emotions](#).

2000                   Honda's [ASIMO](#) robot, an artificially intelligent humanoid robot, is able to walk as fast as a human, delivering trays to customers in a restaurant setting.

2001                   *A.I. Artificial Intelligence* is released, a Steven Spielberg film about David, a childlike android uniquely programmed with the ability to love.

2004                   The first [DARPA Grand Challenge](#), a prize competition for autonomous vehicles, is held in the Mojave Desert. None of the autonomous vehicles finished the 150-mile route.

2006                   Oren Etzioni, Michele Banko, and Michael Cafarella coin the term "[machine reading](#)," defining it as an inherently unsupervised "autonomous understanding of text."

2006                   Geoffrey Hinton publishes "[Learning Multiple Layers of Representation](#)," summarizing the ideas that have led to "multilayer neural networks that contain top-down connections and training them to generate sensory data rather than to classify it," i.e., the new approaches to deep learning.

2007                   Fei Fei Li and colleagues at Princeton University

start to assemble [ImageNet](#), a large database of annotated images designed to aid in visual object recognition software research.

- 2009 Rajat Raina, Anand Madhavan and Andrew Ng publish "[Large-scale Deep Unsupervised Learning using Graphics Processors](#)," arguing that "modern graphics processors far surpass the computational capabilities of multicore CPUs, and have the potential to revolutionize the applicability of deep unsupervised learning methods."
- 2009 Google starts developing, in secret, [a driverless car](#). In 2014, it became the first to pass, in [Nevada](#), a U.S. state self-driving test.
- 2009 Computer scientists at the Intelligent Information Laboratory at Northwestern University develop [Stats Monkey](#), a program that writes sport news stories without human intervention.
- 2010 Launch of the ImageNet Large Scale Visual Recognition Challenge (ILSVCR), an annual AI object recognition competition.
- 2011 A convolutional neural network [wins the German Traffic Sign Recognition competition](#) with 99.46% accuracy (vs. humans at 99.22%).
- 2011 Watson, a natural language question answering computer, [competes on Jeopardy!](#) and defeats two former champions.
- 2011 Researchers at the IDSIA in Switzerland [report](#) a 0.27% error rate in handwriting recognition using convolutional neural networks, a significant improvement over the 0.35%-0.40% error rate in previous years.
- June 2012 Jeff Dean and Andrew Ng [report](#) on an experiment in which they showed a very large neural network 10 million unlabeled

images randomly taken from YouTube videos, and “to our amusement, one of our artificial neurons learned to respond strongly to pictures of... cats.”

October 2012 A convolutional neural network designed by researchers at the University of Toronto achieve an error rate of only 16% in the [ImageNet Large Scale Visual Recognition Challenge](#), a significant improvement over the 25% error rate achieved by the best entry the year before.

March 2016 Google DeepMind's [AlphaGo](#) defeats Go champion Lee Sedol.

The Web (especially Wikipedia) is a great source for the history of artificial intelligence. Other key sources include Nils Nilsson, *The Quest for Artificial Intelligence: A History of Ideas and Achievements*; Stuart Russell and Peter Norvig, *Artificial Intelligence: A Modern Approach*; Pedro Domingos, *The Master Algorithm: How the Quest for the Ultimate Learning Machine Will Remake Our World*; and [Artificial Intelligence and Life in 2030](#). Please comment regarding inadvertent omissions and inaccuracies.

See also [A Very Short History of Data Science](#), [A Very Short History of Big Data](#), and [A Very Short History of Information Technology \(IT\)](#).