

Artificial Intelligence

Thought-capable [artificial beings](#) appeared as [storytelling devices](#) in antiquity,[24] and have been common in fiction, as in [Mary Shelley's *Frankenstein*](#) or [Karel Čapek's *R.U.R. \(Rossum's Universal Robots\)*](#).[25] These characters and their fates raised many of the same issues now discussed in the [ethics of artificial intelligence](#).[20]

The study of mechanical or "formal" reasoning began with [philosophers](#) and mathematicians in antiquity. The study of mathematical logic led directly to [Alan Turing's theory of computation](#), which suggested that a machine, by shuffling symbols as simple as "0" and "1", could simulate any conceivable act of mathematical deduction. This insight, that digital computers can simulate any process of formal reasoning, is known as the [Church–Turing thesis](#).[26] Along with concurrent discoveries in [neurobiology](#), [information theory](#) and [cybernetics](#), this led researchers to consider the possibility of building an electronic brain. Turing proposed that "if a human could not distinguish between responses from a machine and a human, the machine could be considered "intelligent".[27] The first work that is now generally recognized as AI was [McCulloch and Pitts'](#) 1943 formal design for [Turing-complete](#) "artificial neurons".[28]

The field of AI research was born at a [workshop](#) at [Dartmouth College](#) in 1956.
[29] Attendees [Allen Newell](#) (CMU), [Herbert Simon](#) (CMU), [John McCarthy](#) (MIT), [Marvin Minsky](#) (MIT) and [Arthur Samuel](#) (IBM) became the founders and leaders of AI research.
[30] They and their students produced programs that the press described as "astonishing":
[31] computers were learning [checkers](#) strategies (c. 1954)[32] (and by 1959 were reportedly playing better than the average human),[33] solving word problems in algebra, proving logical theorems ([Logic Theorist](#), first run c. 1956) and speaking English.[34] By the middle of the 1960s, research in the U.S. was heavily funded by the [Department of Defense](#)[35] and laboratories had been established around the world.[36] AI's founders were optimistic about the future: [Herbert Simon](#) predicted, "machines will be capable, within twenty years, of doing any work a man can do". [Marvin Minsky](#) agreed, writing, "within a generation ... the problem of creating 'artificial intelligence' will substantially be solved".[8]

They failed to recognize the difficulty of some of the remaining tasks. Progress slowed and in 1974, in response to the criticism of [Sir James Lighthill](#)[37] and ongoing pressure from the US Congress to fund more productive projects, both the U.S. and British governments cut off exploratory research in AI. The next few years would later be called an "[AI winter](#)", [10] a period when obtaining funding for AI projects was difficult.

In the early 1980s, AI research was revived by the commercial success of [expert systems](#), [38] a form of AI program that simulated the knowledge and analytical skills of human experts. By 1985, the market for AI had reached over a billion dollars. At the same time, Japan's [fifth generation computer](#) project inspired the U.S and British governments to restore funding for academic research.[9] However, beginning with the collapse of the [Lisp Machine](#) market in 1987, AI once again fell into disrepute, and a second, longer-lasting hiatus began.[11]

In the late 1990s and early 21st century, AI began to be used for logistics, [data mining](#), [medical diagnosis](#) and other areas.[23] The success was due to increasing computational power (see [Moore's law](#)), greater emphasis on solving specific problems, new ties between AI and other fields (such as [statistics](#), [economics](#) and [mathematics](#)), and a commitment by researchers to mathematical methods and scientific standards.[39] [Deep Blue](#) became the first computer chess-playing system to beat a reigning world chess champion, [Garry Kasparov](#), on 11 May 1997.[40]

