



# Fact Sheet

## About the ACM A.M. Turing Award

The ACM A.M. Turing Award is the Association for Computing Machinery’s most prestigious technical award and is widely recognized as the preeminent award in the computing field. Since its inception in 1966, the Turing Award has honored the computer scientists and engineers who created the systems and underlying theoretical foundations that have propelled the information technology industry. Presented annually, the Turing Award is often referred to as the “Nobel Prize of Computing” and carries a \$1 million prize, with financial support provided by Google, Inc.

Turing Laureates have been selected for contributions across the many disciplines of the field, in areas including programming languages, computer architecture, artificial intelligence, data science, cryptography and the theoretical foundations of computing. Reflecting ACM’s international presence and the global reach of computing, Turing Laureates have hailed from countries around the world including Canada, China, Denmark, India, Latvia, Netherlands, Norway, Israel, Italy, Switzerland, the United Kingdom and the United States.

An eight-member committee composed of leading experts in the field, including former Turing Laureates, reviews nominations before selecting a recipient or recipients each spring. Although the long-term influences of each nominee’s work are taken into consideration, there should be a particular outstanding technical achievement that constitutes the principal claim to the award.

In accepting the honor, each Laureate agrees to give a “Turing Award Lecture” during the succeeding year. ACM publishes these lectures in its Digital Library as part of its mission to advance computing research and scholarship.

The A.M. Turing Award is named for Alan Mathison Turing (1912-1954), the British mathematician and computer scientist who articulated the mathematical foundation and limits of computing, and who was a key contributor to the Allied cryptanalysis of the Enigma cipher during World War II.

## The Turing Laureates

Recipient	Citation
2016 Tim Berners-Lee	<i>For inventing the World Wide Web, the first web browser, and the fundamental protocols and algorithms allowing the Web to scale.</i>
2015 Martin E. Hellman and Whitfield Diffie	<i>For inventing and promulgating both asymmetric public-key cryptography, including its application to digital signatures, and a practical cryptographic key-exchange method.</i>
2014 Michael Stonebraker	<i>For fundamental contributions to the concepts and practices underlying modern database systems.</i>
2013 Leslie Lamport	<i>For fundamental contributions to the theory and practice of distributed and concurrent systems, notably the invention of concepts such as causality and logical clocks, safety and liveness, replicated state machines, and sequential consistency.</i>
2012 Shafi Goldwasser and Silvio Micali	<i>For transformative work that laid the complexity-theoretic foundations for the science of cryptography, and in the process pioneered new methods for efficient verification of mathematical proofs in complexity theory.</i>

<b>Recipient</b>	<b>Citation</b>
2011 Judea Pearl	<i>For fundamental contributions to artificial intelligence through the development of a calculus for probabilistic and causal reasoning.</i>
2010 Leslie G. Valiant	<i>For transformative contributions to the theory of computation, including the theory of probably approximately correct (PAC) learning, the complexity of enumeration and of algebraic computation, and the theory of parallel and distributed computing.</i>
2009 Charles P. Thacker	<i>For the pioneering design and realization of the first modern personal computer -- the Alto at Xerox PARC -- and seminal inventions and contributions to local area networks (including the Ethernet), multiprocessor workstations, snooping cache coherence protocols, and tablet personal computers.</i>
2008 Barbara Liskov	<i>For contributions to practical and theoretical foundations of programming language and system design, especially related to data abstraction, fault tolerance, and distributed computing.</i>
2007 Edmund M. Clarke, E. Allen Emerson and Joseph Sifakis	<i>For their role in developing Model-Checking into a highly effective verification technology that is widely adopted in the hardware and software industries.</i>
2006 Frances E. Allen	<i>For pioneering contributions to the theory and practice of optimizing compiler techniques that laid the foundation for modern optimizing compilers and automatic parallel execution.</i>
2005 Peter Naur	<i>For fundamental contributions to programming language design and the definition of Algol 60, to compiler design, and to the art and practice of computer programming.</i>
2004 Vinton G. Cerf and Robert E. Kahn	<i>For pioneering work on internetworking, including the design and implementation of the Internet's basic communications protocols, TCP/IP, and for inspired leadership in networking.</i>
2003 Alan Kay	<i>For pioneering many of the ideas at the root of contemporary object-oriented programming languages, leading the team that developed Smalltalk, and for fundamental contributions to personal computing.</i>
2002 Leonard M. Adleman, Ronald L. Rivest, and Adi Shamir	<i>For their ingenious contribution to making public-key cryptography useful in practice.</i>
2001 Ole-Johan Dahl and Kristen Nygaard	<i>For ideas fundamental to the emergence of object oriented programming, through their design of the programming languages Simula I and Simula 67.</i>
2000 Andrew Chi-Chih Yao	<i>In recognition of his fundamental contributions to the theory of computation, including the complexity-based theory of pseudorandom number generation, cryptography, and communication complexity.</i>
1999 Frederick P Brooks, Jr	<i>For landmark contributions to computer architecture, operating systems, and software engineering.</i>
1998 Jim Gray	<i>For seminal contributions to database and transaction processing research and technical leadership in system implementation.</i>
1997 Douglas Engelbart	<i>For an inspiring vision of the future of interactive computing and the invention of key technologies to help realize this vision.</i>
1996 Amir Pnueli	<i>For seminal work introducing temporal logic into computing science and for outstanding contributions to program and system verification.</i>
1995 Manuel Blum	<i>In recognition of his contributions to the foundations of computational complexity theory and its application to cryptography and program checking.</i>
1994 Edward Feigenbaum and Raj Reddy	<i>For pioneering the design and construction of large scale artificial intelligence systems, demonstrating the practical importance and potential commercial impact of artificial intelligence technology.</i>

<b>Recipient</b>	<b>Citation</b>
1993 Juris Hartmanis and Richard E. Stearns	<i>In recognition of their seminal paper which established the foundations for the field of computational complexity theory.</i>
1992 Butler W. Lampson	<i>For contributions to the development of distributed, personal computing environments and the technology for their implementation: workstations, networks, operating systems, programming systems, displays, security and document publishing.</i>
1991 Robin Milner	<i>For three distinct and complete achievements: LCF, the mechanization of Scott's Logic of Computable Functions, probably the first theoretically based yet practical tool for machine assisted proof construction; ML, the first language to include polymorphic type inference together with a type-safe exception-handling mechanism; CCS, a general theory of concurrency. In addition, he formulated and strongly advanced full abstraction, the study of the relationship between operational and denotational semantics.</i>
1990 Fernando J. Corbató	<i>For his pioneering work organizing the concepts and leading the development of the general-purpose, large-scale, time-sharing and resource-sharing computer systems, CTSS and Multics.</i>
1989 William Kahan	<i>For his fundamental contributions to numerical analysis. One of the foremost experts on floating-point computations. Kahan has dedicated himself to making the world safe for numerical computations"</i>
1988 Ivan Sutherland	<i>For his pioneering and visionary contributions to computer graphics, starting with Sketchpad, and continuing after.</i>
1987 John Cocke	<i>For significant contributions in the design and theory of compilers, the architecture of large systems and the development of reduced instruction set computers (RISC); for discovering and systematizing many fundamental transformations now used in optimizing compilers including reduction of operator strength, elimination of common subexpressions, register allocation, constant propagation, and dead code elimination.</i>
1986 John Hopcroft and Robert Tarjan	<i>For fundamental achievements in the design and analysis of algorithms and data structures.</i>
1985 Richard M. Karp	<i>For his continuing contributions to the theory of algorithms including the development of efficient algorithms for network flow and other combinatorial optimization problems, the identification of polynomial-time computability with the intuitive notion of algorithmic efficiency, and, most notably, contributions to the theory of NP-completeness. Karp introduced the now standard methodology for proving problems to be NP-complete which has led to the identification of many theoretical and practical problems as being computationally difficult.</i>
1984 Niklaus Wirth	<i>For developing a sequence of innovative computer languages, EULER, ALGOL-W, MODULA and PASCAL. PASCAL has become pedagogically significant and has provided a foundation for future computer language, systems, and architectural research.</i>
1983 Ken Thompson and Dennis M. Ritchie	<i>For their development of generic operating systems theory and specifically for the implementation of the UNIX operating system.</i>
1982 Stephen A. Cook	<i>For his advancement of our understanding of the complexity of computation in a significant and profound way. His seminal paper, The Complexity of Theorem Proving Procedures</i>
1981 Edgar F. Codd	<i>For his fundamental and continuing contributions to the theory and practice of database management systems.</i>
1980 C. Antony (Tony) Hoare	<i>For his fundamental contributions to the definition and design of programming languages.</i>
1979 Kenneth E. Iverson	<i>For his pioneering effort in programming languages and mathematical notation resulting in what the computing field now knows as APL, for his contributions to the implementation of interactive systems, to educational uses of APL, and to programming language theory and practice.</i>

<b>Recipient</b>	<b>Citation</b>
1978 Robert W. Floyd	<i>For having a clear influence on methodologies for the creation of efficient and reliable software, and for helping to found the following important subfields of computer science: the theory of parsing, the semantics of programming languages, automatic program verification, automatic program synthesis, and analysis of algorithms.</i>
1977 John Backus	<i>For profound, influential, and lasting contributions to the design of practical high-level programming systems, notably through his work on FORTRAN, and for seminal publication of formal procedures for the specification of programming languages.</i>
1976 Michael O. Rabin and Dana S. Scott	<i>For their joint paper "Finite Automata and Their Decision Problem," that introduced the idea of nondeterministic machines, which has proved to be an enormously valuable concept. Their classic paper has been a continuous source of inspiration for subsequent work in this field.</i>
1975 Allen Newell and Herbert A. Simon	<i>In joint scientific efforts extending over twenty years, initially in collaboration with J. C. Shaw at the RAND Corporation, and subsequently with numerous faculty and student colleagues at Carnegie-Mellon University, Newell and Simon made basic contributions to artificial intelligence, the psychology of human cognition, and list processing.</i>
1974 Donald E. Knuth	<i>For his major contributions to the analysis of algorithms and the design of programming languages, and in particular for his contributions to the art of computer programming" through his well-known books in a continuous series by this title.</i>
1973 Charles W. Bachman	<i>For his outstanding contributions to database technology.</i>
1972 Edsger W. Dijkstra	<i>For fundamental contributions to programming as a high, intellectual challenge; for eloquent insistence and practical demonstration that programs should be composed correctly, not just debugged into correctness; for illuminating perception of problems at the foundations of program design.</i>
1971 John McCarthy	<i>Dr. McCarthy's lecture "The Present State of Research on Artificial Intelligence" is a topic that covers the area in which he has achieved considerable recognition for his work.</i>
1970 James H. Wilkinson	<i>For his research in numerical analysis to facilitate the use of the high-speed digital computer, having received special recognition for his work in computations in linear algebra and "backward" error analysis.</i>
1969 Marvin Minsky	<i>For his central role in creating, shaping, promoting, and advancing the field of Artificial Intelligence.</i>
1968 Richard Hamming	<i>For his work on numerical methods, automatic coding systems, and error-detecting and error-correcting codes.</i>
1967 Maurice Wilkes	<i>Professor Wilkes is best known as the builder and designer of the EDSAC, the first computer with an internally stored program. Built in 1949, the EDSAC used a mercury delay line memory. He is also known as the author, with Wheeler and Gill, of a volume on Preparation of Programs for Electronic Digital Computers" in 1951, in which program libraries were effectively introduced.</i>
1966 Alan J. Perlis	<i>For his influence in the area of advanced programming techniques and compiler construction.</i>