




Donald Knuth

Fletcher Jones Professor of Computer Science, Emeritus

 Curriculum Vitae available Online

Bio

BIO

Donald Ervin Knuth is an American computer scientist, mathematician, and Professor Emeritus at Stanford University.

He is the author of the multi-volume work *The Art of Computer Programming* and has been called the "father" of the analysis of algorithms. He contributed to the development of the rigorous analysis of the computational complexity of algorithms and systematized formal mathematical techniques for it. In the process he also popularized the asymptotic notation. In addition to fundamental contributions in several branches of theoretical computer science, Knuth is the creator of the TeX computer typesetting system, the related METAFONT font definition language and rendering system, and the Computer Modern family of typefaces.

As a writer and scholar,[4] Knuth created the WEB and CWEB computer programming systems designed to encourage and facilitate literate programming, and designed the MIX/MMIX instruction set architectures. As a member of the academic and scientific community, Knuth is strongly opposed to the policy of granting software patents. He has expressed his disagreement directly to the patent offices of the United States and Europe. (via Wikipedia)

ACADEMIC APPOINTMENTS

- Professor Emeritus, Computer Science

HONORS AND AWARDS

- Grace Murray Hopper Award, ACM (1971)
- Member, American Academy of Arts and Sciences (1973)
- Turing Award, ACM (1974)
- Lester R Ford Award, Mathematical Association of America (1975)
- Member, National Academy of Sciences (1975)
- Distinguished Alumni Award, California Institute of Technology (1978)
- National Medal of Science, President Carter (1979)
- Distinguished Fellow, British Computer Society (1980)
- Wallace McDowell Award, IEEE Computer Society (1980)
- Member, National Academy of Engineering (1981)
- Priestley Award, Dickinson College (1981)
- Honorary Member, IEEE (1982)
- Golden Plate Award, American Academy of Achievement (1985)

- SIGCSE Award (Computer Science Education), ACM (1986)
- Software Systems Award, ACM (1986)
- Steele Prize for Exposition, American Mathematical Society (1986)
- New York Academy of Sciences Award, New York Academy of Sciences (1987)
- Franklin Medal, Franklin Institute (1988)
- Gold Medal Award, Case Alumni Association (1990)
- Foreign Associate, Académie des Sciences, Paris (1992)
- Foreign Member, Norwegian Academy of Sciences (1993)
- Lester R Ford Award, Mathematical Association of America (1993)
- Adelsköld Medal, Royal Swedish Academy of Sciences (1994)
- Best New Book: Computer Science, Association of American Publishers (1994)
- Fellow, ACM (1994)
- Harvey Prize, Technion (1995)
- John von Neumann Medal, IEEE (1995)
- Kyoto Prize, Inamori Foundation (1996)
- Fellow, Computer History Museum (1998)
- Foreign Member, Royal Society of London (2003)
- Honorary Fellow, Magdalen College, Oxford (2005)
- Foreign Member, Russian Academy of Sciences (2008)
- Fellow, SIAM (2009)
- Frontiers of Knowledge Award, BBVA Foundation (2010)
- Katayanagi Prize, Carnegie-Mellon University (2010)
- ABACUS Award, Upsilon Pi Upsilon (2011)
- Faraday Medal, IET (2011)
- Hero Award, Stanford University School of Engineering (2011)
- Member, American Philosophical Society (2012)
- Platinum Gold Medal for Computer Science Education, ETH Zürich (2012)
- Fellow, American Mathematical Society (2013)
- Peter Karow Award, ATypI (2013)
- Honorary Member, London Mathematical Society (2015)
- Trotter Prize, Texas A&M University (2018)

PROFESSIONAL EDUCATION

- PhD, California Institute of Technology , Mathematics (1963)

PATENTS

- Donald Knuth, Stephen N Schiller. "United States Patent 5,305,118 Methods of controlling dot size in digital half toning with multi-cell threshold arrays", Adobe Systems, Apr 19, 1994
- Donald Knuth, LeRoy R Guck, Lawrence G Hanson. "United States Patent 3,626,167 Scaling and number base converting method and apparatus", Burroughs Corporation, Dec 7, 1971
- Donald Knuth. "United States Patent 3,548,174 Random number generator", Burroughs Corporation, Dec 15, 1970

- Donald Knuth, Donald P Hynes. "United States Patent 3,454,929 Computer edit system", Burroughs Corporation, Jul 8, 1969
- Donald Knuth, Roger E Packard. "United States Patent 3,422,405 Digital computers having an indirect field length operation", Burroughs Corporation, Jan 14, 1969

LINKS

- <http://www-cs-faculty.stanford.edu/~knuth/>: <http://www-cs-faculty.stanford.edu/~knuth/>

Publications

PUBLICATIONS

- **Selected papers on fun and games**
Knuth, D. E.
CSLI Publications.2011
- **Combinatorial algorithms, part 1** *The art of computer programming*
Knuth, D. E.
Addison-Wesley.2005; 4A
- **MMIX MIXWARE: A RISC COMPUTER FOR THE THIRD MILLENNIUM**
Knuth, D. E.
1999; 1750: 2-?
- **Digital Typography**
Knuth, D. E.
CSLI Publications.1999
- **Sorting and searching** *The art of computer programming*
Knuth, D. E.
Addison-Wesley.1998; 3
- **Fundamental Algorithms** *The art of computer programming*
Knuth, D. E.
Addison-Wesley.1997; 1
- **Seminumerical algorithms** *The art of computer programming*
Knuth, D. E.
Addison-Wesley.1997; 2
- **Concrete Mathematics: A foundation for computer science**
Graham, R. L., Knuth, D. E., Patashnik, O.
Addison-Wesley.1994
- **The Stanford GraphBase: A platform for combinatorial computing**
Knuth, D. E.
Addison-Wesley.1994
- **THE BIRTH OF THE GIANT COMPONENT** *RANDOM STRUCTURES & ALGORITHMS*
Janson, S., Knuth, D. E., Luczak, T., Pittel, B.
1993; 4 (3): 233-358
- **2 NOTES ON NOTATION** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D. E.
1992; 99 (5): 403-422
- **AXIOMS AND HULLS** *LECTURE NOTES IN COMPUTER SCIENCE*
Knuth, D. E.
1992; 606: R3-?
- **3:16 Bible Texts Illuminated**

- Knuth, D. E.
A R Editions.1990
- **THE ERRORS OF TEX** *SOFTWARE-PRACTICE & EXPERIENCE*
Knuth, D. E.
1989; 19 (7): 607-685
 - **The METAFONTbook** *Computers & Typesetting*
Knuth, D. E.
Addison-Wesley.1986; C
 - **LITERATE PROGRAMMING** *COMPUTER JOURNAL*
Knuth, D. E.
1984; 27 (2): 97-111
 - **The TeXbook** *Computers & Typesetting*
Knuth, D. E.
Addison-Wesley.1984; A
 - **THE CONCEPT OF A META-FONT** *VISIBLE LANGUAGE*
Knuth, D. E.
1982; 16 (1): 3-27
 - **BREAKING PARAGRAPHS INTO LINES** *SOFTWARE-PRACTICE & EXPERIENCE*
Knuth, D. E., Plass, M. F.
1981; 11 (11): 1119-1184
 - **MATHEMATICAL TYPOGRAPHY** *BULLETIN OF THE AMERICAN MATHEMATICAL SOCIETY*
Knuth, D. E.
1979; 1 (2): 337-372
 - **MATHEMATICS AND COMPUTER SCIENCE - COPING WITH FINITENESS** *SCIENCE*
Knuth, D. E.
1976; 194 (4271): 1235-1242
 - **COMPUTER PROGRAMMING AS AN ART** *COMMUNICATIONS OF THE ACM*
Knuth, D. E.
1974; 17 (12): 667-673
 - **Surreal Numbers**
Knuth, D. E.
Addison-Wesley.1974
 - **Dispersed Rooks on a Chessboard** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D. E.
2020; 127 (4): 379
 - **A Property of Conjugate Partitions Proposal** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D. E.
2020; 127 (2): 186
 - **Log-Concavity of a Binomial Sum Proposal** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D., Zhou, L.
2019; 126 (3): 283-84
 - **A Permanent Solution** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D.
2018; 125 (10): 946
 - **Fantasia Apocalyptica Illustrated**
Bibby, D. R., Knuth, D. E.

CSLI Publications.2018

- **Balanced Tilings of a Rectangle with Three Rows** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D.
2018; 125 (6): 566
- **Mathematical Vanity Plates** *MATHEMATICAL INTELLIGENCER*
Knuth, D. E.
2011; 33 (1): 33-45
- **Companion to the papers of Donald Knuth**
Knuth, D. E.
CSLI Publications.2011
- **Selected papers on design of algorithms**
Knuth, D. E.
CSLI Publications.2010
- **A symmetric Eulerian identity** *Journal of Combinatorics*
Chung, F., Graham, R., Knuth, D.
2010; 1 (1): 29-38
- **Robert W Floyd, in memoriam** *IEEE ANNALS OF THE HISTORY OF COMPUTING*
Knuth, D. E.
2004; 26 (2): 75-83
- **Efficient coroutine generation of constrained gray sequences** *FROM OBJECT-ORIENTATION TO FORMAL METHODS*
Knuth, D. E., Ruskey, R.
2004; 2635: 183-208
- **Selected papers on discrete mathematics**
Knuth, D. E.
CSLI Publications.2003
- **Selected papers on computer languages**
Knuth, D. E.
CSLI Publications.2003
- **Things a computer scientist rarely talks about**
Knuth, D. E.
CSLI Publications.2001
- **Selected papers on the analysis of algorithms**
Knuth, D. E.
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- **Dancing links** *Millennial Perspectives in Computer Science*
Knuth, D. E.
Palgrave.2000: 187–214
- **Linear probing and graphs** *ALGORITHMICA*
Knuth, D. E.
1998; 22 (4): 561-568
- **Aztec diamonds, checkerboard graphs, and spanning trees** *JOURNAL OF ALGEBRAIC COMBINATORICS*
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1997; 6 (3): 253-257
- **Partitioned tensor products and their spectra** *JOURNAL OF ALGEBRAIC COMBINATORICS*
Knuth, D. E.

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- **Shellsort with three increments** *RANDOM STRUCTURES & ALGORITHMS*
Janson, S., Knuth, D. E.
1997; 10 (1-2): 125-142
- **An exact analysis of stable allocation** *JOURNAL OF ALGORITHMS*
Knuth, D. E.
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- **On the Lambert W function** *ADVANCES IN COMPUTATIONAL MATHEMATICS*
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1996; 1: 1-19
- **Selected papers on computer science**
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CSLI Publications.1996
- **The Knowlton-Graham partition problem** *JOURNAL OF COMBINATORIAL THEORY SERIES A*
Knuth, D. E.
1996; 73 (1): 185-189
- **ON THE INVERSION OF $Y(\alpha) E(Y)$ IN TERMS OF ASSOCIATED STIRLING NUMBERS** *COMPTES RENDUS DE L ACADEMIE DES SCIENCES SERIE I-MATHEMATIQUE*
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- **2-WAY ROUNDING** *SIAM JOURNAL ON DISCRETE MATHEMATICS*
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- **Polynomials involving the floor function** *MATHEMATICA SCANDINAVICA*
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- **SPEECH UPON RECEIVING HONORARY DEGREE FROM ST-PETERSBURG UNIVERSITY** *PROGRAMMING AND COMPUTER SOFTWARE*
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- **MINI-INDEXES FOR LITERATE PROGRAMS** *SOFTWARE-CONCEPTS AND TOOLS*
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- **The sandwich theorem** *Electronic Journal of Combinatorics*
Knuth, D. E.
1994; 1: 1-48
- **Leaper graphs** *The Mathematical Gazette*
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- **FAULHABER,JOHANN AND SUMS OF POWERS** *MATHEMATICS OF COMPUTATION*
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- **THE STANFORD GRAPHBASE - A PLATFORM FOR COMBINATORIAL ALGORITHMS** *4TH ANNUAL ACM-SIAM SYMP ON DISCRETE ALGORITHMS*

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- **THE PROBLEM OF COMPATIBLE REPRESENTATIVES** *SIAM JOURNAL ON DISCRETE MATHEMATICS*
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 - **RANDOMIZED INCREMENTAL CONSTRUCTION OF DELAUNAY AND VORONOI DIAGRAMS** *ALGORITHMICA*
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1992; 7 (4): 381-413
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 - **Context-free multilanguages** *Theoretical Studies in Computer Science*
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 - **Literate Programming**
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 - **THEORY AND PRACTICE** *THEORETICAL COMPUTER SCIENCE*
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 - **EFFICIENT REPRESENTATION OF PERM GROUPS** *COMBINATORICA*
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 - **Textbook examples of recursion** *Artificial Intelligence and Mathematical Theory of Computation*
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 - **ADDITION MACHINES** *SIAM JOURNAL ON COMPUTING*
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 - **NESTED SATISFIABILITY** *ACTA INFORMATICA*
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 - **Mathematics for the analysis of algorithms**
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Birkhauser Boston.1990
 - **THE GENESIS OF ATTRIBUTE GRAMMARS** *INTERNATIONAL WORKSHOP ON ATTRIBUTE GRAMMARS AND THEIR APPLICATIONS (WAGA)*
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- **AMS EULER - A NEW TYPEFACE FOR MATHEMATICS** *SCHOLARLY PUBLISHING*
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1989; 20 (3): 131-157
- **A RECURRENCE RELATED TO TREES** *PROCEEDINGS OF THE AMERICAN MATHEMATICAL SOCIETY*
Knuth, D. E., Pittel, B.
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- **THE POWER OF A PRIME THAT DIVIDES A GENERALIZED BINOMIAL COEFFICIENT** *JOURNAL FUR DIE REINE UND ANGEWANDTE MATHEMATIK*
Knuth, D. E., Wilf, H. S.
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- **A NOTE ON STRATEGY ELIMINATION IN BIMATRIX GAMES** *OPERATIONS RESEARCH LETTERS*
Knuth, D. E., Papadimitriou, C. H., Tsitsiklis, J. N.
1988; 7 (3): 103-107
- **DIGITAL HALFTONES BY DOT DIFFUSION** *ACM TRANSACTIONS ON GRAPHICS*
Knuth, D. E.
1987; 6 (4): 245-273
- **COMPUTER-SCIENCE CONSIDERATIONS** *BYTE*
VOSE, G. M., Williams, G., Knuth, D.
1986; 11 (2): 169-?
- **THE IBM-650 - AN APPRECIATION FROM THE FIELD** *ANNALS OF THE HISTORY OF COMPUTING*
Knuth, D. E.
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- **Computer Modern Typefaces** *Computers & Typesetting*
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- **METAFONT: The Program** *Computers & Typesetting*
Knuth, D. E.
Addison-Wesley.1986; D
- **TeX: The Program** *Computers & Typesetting*
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- **EFFICIENT BALANCED CODES** *IEEE TRANSACTIONS ON INFORMATION THEORY*
Knuth, D. E.
1986; 32 (1): 51-53
- **DECIPHERING A LINEAR CONGRUENTIAL ENCRYPTION** *IEEE TRANSACTIONS ON INFORMATION THEORY*
Knuth, D. E.
1985; 31 (1): 49-52
- **Semi-optimal bases for linear dependencies** *Linear and Multilinear Algebra*
Knuth, D. E.
1985; 17 (1): 1-4
- **ALGORITHMIC THINKING AND MATHEMATICAL THINKING** *AMERICAN MATHEMATICAL MONTHLY*
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1985; 92 (3): 170-181

- **OPTIMAL PREPAGING AND FONT CACHING** *ACM TRANSACTIONS ON PROGRAMMING LANGUAGES AND SYSTEMS*
FUCHS, D. R., Knuth, D. E.
1985; 7 (1): 62-79
- **LESSONS LEARNED FROM METAFONT + USE OF COMPUTERS IN TYPE DESIGN** *VISIBLE LANGUAGE*
Knuth, D. E.
1985; 19 (1): 34-53
- **DYNAMIC HUFFMAN CODING** *JOURNAL OF ALGORITHMS*
Knuth, D. E.
1985; 6 (2): 163-180
- **AN ANALYSIS OF OPTIMUM CACHING** *JOURNAL OF ALGORITHMS*
Knuth, D. E.
1985; 6 (2): 181-199
- **THE TOILET PAPER PROBLEM** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D. E.
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- **THE COMPLEXITY OF SONGS** *COMMUNICATIONS OF THE ACM*
Knuth, D. E.
1984; 27 (4): 344-348
- **THE DISTRIBUTION OF CONTINUED-FRACTION APPROXIMATIONS** *JOURNAL OF NUMBER THEORY*
Knuth, D. E.
1984; 19 (3): 443-448
- **AN ALGORITHM FOR BROWNIAN ZEROS** *COMPUTING*
Knuth, D. E.
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- **HUFFMAN-ALGORITHM VIA ALGEBRA** *JOURNAL OF COMBINATORIAL THEORY SERIES A*
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- **A PERMANENT INEQUALITY** *AMERICAN MATHEMATICAL MONTHLY*
Knuth, D. E.
1981; 88 (10): 731-740
- **Supernatural numbers** *The Mathematical Gardner*
Knuth, D. E.
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- **VERIFICATION OF LINK-LEVEL PROTOCOLS** *BIT*
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- **The early development of programming languages** *A History of Computing in the Twentieth Century*
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- **The letter S** *Mathematical Intelligencer*
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- **LEXICOGRAPHIC PERMUTATIONS WITH RESTRICTIONS** *DISCRETE APPLIED MATHEMATICS*
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- **INHOMOGENEOUS SORTING** *INTERNATIONAL JOURNAL OF COMPUTER & INFORMATION SCIENCES*
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- **The expected linearity of a simple equivalence algorithm** *Theoretical Computer Science*
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- **COMPLEXITY RESULTS FOR BANDWIDTH MINIMIZATION** *SIAM JOURNAL ON APPLIED MATHEMATICS*
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- **IDENTITIES FROM PARTITION INVOLUTIONS** *FIBONACCI QUARTERLY*
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- **DELETIONS THAT PRESERVE RANDOMNESS** *IEEE TRANSACTIONS ON SOFTWARE ENGINEERING*
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- **Notes on generalized Dedekind sums** *Acta Arithmetica*
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