Alan M Turing

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Alan Turing is regarded as one of the greatest scientists of the 20th century. But who was Turing, and what did he achieve during his tragically short life of 41 years? Best known as the genius who broke Germany's most secret codes during the war of 1939-45, Turing was also the father of the modern computer. Today, all who 'click-to-open' are familiar with the impact of Turing's ideas. Here, B. Jack Copeland provides an account of Turing's life and work, exploring the key elements of his life-story in tandem with his leading ideas and contributions. The book highlights Turing's contributions to computing and to computer science, including Artificial Intelligence and Artificial Life, and the emphasis throughout is on the relevance of his work to modern developments. The story of his contributions to codebreaking during the Second World War is set in the context of his thinking about machines, as is the account of his work in the foundations of mathematics.

This collection of short expository, critical and speculative texts offers a field guide to the cultural, political, social and aesthetic impact of software. Experts from a range of disciplines each take a key topic in software and the understanding of software, such as algorithms and logical structures.

'In a short life he accomplished much, and to the roll of great names in the history of his particular studies added his own.' So is described one of the greatest figures of the twentieth century, yet Alan Turing's name was not widely recognised until his contribution to the breaking of the German Enigma code became public in the 1970s. The story of Turing's life fascinates and in the years since his suicide, Turing's reputation has only grown, as his contributions to logic, mathematics, computing, artificial intelligence and computational biology have become better appreciated. To commemorate the centenary of Turing's birth, this republication of his mother's biography is enriched by a new foreword by Martin Davis and a never-before-published memoir by Alan's older brother. The contrast between this memoir and the original biography reveals tensions and sheds new light on Turing's relationship with his family, and on the man himself.

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The mathematical genius Alan Turing, now well known for his crucial wartime role in breaking the ENIGMA code, was the first to conceive of the fundamental principle of the modern computer-the idea of controlling a computing machine's operations by means of a program of coded instructions, stored in the machine's 'memory'. In 1945 Turing drew up his revolutionary design for an electronic computing machine-his Automatic Computing Engine ('ACE'). A pilot model of the ACE ran its first program in 1950 and the production version, the 'DEUCE', went on to become a cornerstone of the fledgling British computer industry. The first 'personal' computer was based on Turing's ACE. Alan Turing's Automatic Computing Engine describes Turing's struggle to build the modern computer. The first detailed history of Turing's contributions to computer science, this text is essential reading for anyone interested in the history of the computer and the history of mathematics. It contains first hand accounts by Turing and by the pioneers of computing who worked with him. As well as relating the story of the invention of the computer, the book clearly describes the hardware and software of the ACE-including the very first computer programs. The book is intended to be accessible to everyone with an interest in computing, and contains numerous diagrams and illustrations as well as original photographs. The book contains chapters describing Turing's path-breaking research in the fields of Artificial Intelligence (AI) and Artificial Life (A-Life). The book has an extensive system of hyperlinks to The Turing Archive for the History of Computing, an on-line library of digital facsimiles of typewritten documents by Turing and the other scientists who pioneered the electronic computer.

Winner of an Outstanding Academic Title Award from CHOICE Magazine Most available cryptology books primarily focus on either mathematics or history. Breaking this mold, Secret History: The Story of Cryptology gives a thorough yet accessible treatment of both the mathematics and history of cryptology. Requiring minimal mathematical prerequisites, the book presents the mathematics in sufficient detail and weaves the history throughout the chapters. In addition to the fascinating historical and political sides of cryptology, the author—a former Scholar-in-Residence at the U.S. National Security Agency (NSA) Center for Cryptologic History—includes interesting instances of codes and ciphers in crime, literature, music, and art. Following a mainly chronological development of concepts, the book focuses on classical cryptology in the first part. It covers Greek and Viking cryptography, the Vigenère cipher, the one-time pad, transposition ciphers, Jefferson's cipher wheel, the Playfair cipher, ADFGX, matrix encryption, World War II cipher systems (including a detailed examination of Enigma), and many other classical methods introduced before World War II. The second part of the book examines modern cryptology. The author looks at the work of Claude Shannon and the origin and current status of the NSA, including some of its Suite B algorithms such as elliptic curve cryptography and the Advanced Encryption Standard. He also details the controversy that surrounded the Data Encryption Standard and the early years of public key cryptography. The book not only provides the how-to of the Diffie-Hellman key exchange and RSA algorithm, but also covers many attacks on the latter. Additionally, it discusses Elgamal, digital signatures, PGP, and stream ciphers and explores future directions such as quantum cryptography and DNA computing. With numerous real-world examples and extensive references, this book skillfully balances the historical aspects of cryptology with its mathematical details. It provides readers with a sound foundation in this dynamic field.

Christof Teuscher revives, analyzes, and simulates Turing's ideas, applying them to different types of problems, and building and training Turing's machines using evolutionary algorithms. In a little known paper entitled 'Intelligent Machinery' Turing investigated connectionist networks, but his work was dismissed as a 'schoolboy essay'and it was left unpublished until 1968, 14 years after his death. This is not a book about today's (classical) neural networks, but about the neuron network-like structures proposed by Turing. One of its novel features is that it actually goes beyond Turing's ideas by proposing new machines. The book also contains a Foreward by B. Jack Copeland and D. Proudfoot.

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This superb exposition of a complex subject examines new developments in the theory and practice of computation from a mathematical perspective, with topics ranging from classical computability to complexity, from biocomputing to quantum computing. This book is suitable for researchers and graduate students in mathematics, philosophy, and computer science with a special interest in logic and foundational issues. Most useful to graduate students are the survey papers on computable analysis and biological computing. Logicians and theoretical physicists will also benefit from this book.

This volume contains a record of some of the lectures and seminars delivered at the Second International School on Engineering Trustworthy Software Systems (SETSS 2016), held in March/April 2016 at Southwest University in Chongqing, China. The six contributions included in this volume provide an overview of leading-edge research in methods and tools for use in computer system engineering. They have been distilled from six courses and two seminars on topics such as: modelling and verification in event-B; parallel programming today; runtime verification; Java in the safety-critical domain; semantics of reactive systems; parameterized unit testing; formal reasoning about infinite data values; and Alan Turing and his remarkable achievements. The material is useful for postgraduate students, researchers, academics, and industrial engineers, who are interested in the theory and practice of methods and tools for the design and programming of trustworthy software systems.

In this 2013 winner of the prestigious R.R. Hawkins Award from the Association of American Publishers, as well as the 2013 PROSE Awards for Mathematics and Best in Physical Sciences & Mathematics, also from the AAP, readers will find many of the most significant contributions from the four-volume set of the Collected Works of A. M. Turing. These contributions, together with commentaries from current experts in a wide spectrum of fields and backgrounds, provide insight on the significance and contemporary impact of Alan Turing's work. Offering a more modern perspective than anything currently available, Alan Turing: His Work and Impact gives wide coverage of the many ways in which Turing's scientific endeavors have impacted current research and understanding of the world. His pivotal writings on subjects including computing, artificial intelligence, cryptography, morphogenesis, and more display continued relevance and insight into today's scientific and technological landscape. This collection provides a great service to researchers, but is also an approachable entry point for readers with limited training in the science, but an urge to learn more about the details of Turing's work. 2013 winner of the prestigious R.R. Hawkins Award from the Association of American Publishers, as well as the 2013 PROSE Awards for Mathematics and Best in Physical Sciences & Mathematics, also from the AAP Named a 2013 Notable Computer Book in Computing Milieux by Computing Reviews Affordable, key collection of the most significant papers by A.M. Turing Commentary explaining the significance of each seminal paper by preeminent leaders in the field Additional resources available online

The story of Alan Turing, World War II's secret hero, whose brilliant mathematical work resulted in the "Enigma" machine which broke the German military code and gave the Allied forces advance knowledge of German military movements

An exhaustive work that represents a landmark exploration of both the philosophical and methodological issues surrounding the search for true artificial intelligence. Distinguished psychologists, computer scientists, philosophers, and programmers from around the world debate weighty issues such as whether a self-conscious computer would create an internet 'world mind'. This hugely important volume explores nothing less than the future of the human race itself.

Written by a distinguished cast of contributors, Alan Turing: Life and Legacy of a Great Thinker is the definitive collection of essays in commemoration of the 90th birthday of Alan Turing. This fascinating text covers the rich facets of his life, thoughts, and legacy, but also sheds some light on the future of computing science with a chapter contributed by visionary Ray Kurzweil, winner of the 1999 National Medal of Technology. Further, important contributions come from the philosopher Daniel Dennett, the Turing biographer Andrew Hodges, and from the distinguished logician Martin Davis, who provides a first critical essay on an emerging and controversial field termed "hypercomputation".
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Alan Turing has long proved a subject of fascination, but following the centenary of his birth in 2012, the code-breaker, computer pioneer, mathematician (and much more) has become even more celebrated with much media coverage, and several meetings, conferences and books raising public awareness of Turing's life and work. This volume will bring together contributions from some of the leading experts on Alan Turing to create a comprehensive guide to Turing that will serve as a useful resource for researchers in the area as well as the increasingly interested general reader. The book will cover aspects of Turing's life and the wide range of his intellectual activities, including mathematics, code-breaking, computer science, logic, artificial intelligence and mathematical biology, as well as his subsequent influence.

Containing never-before-published material, this fascinating account sheds new light on one of the greatest figures of the twentieth century.

The pixel as the organizing principle of all pictures, from cave paintings to Toy Story. The Great Digital Convergence of all media types into one universal digital medium occurred, with little fanfare, at the recent turn of the millennium. The bit became the universal medium, and the pixel--a particular packaging of bits--conquered the world. Henceforward, nearly every picture in the world would be composed of pixels--cell phone pictures, app interfaces, Mars Rover transmissions, book illustrations, videogames. In A Biography of the Pixel, Pixar cofounder Alvy Ray Smith argues that the pixel is the organizing principle of most modern media, and he presents a few simple but profound ideas that unify the dazzling varieties of digital image making. Smith's story of the pixel's development begins with Fourier waves, proceeds through Turing machines, and ends with the first digital movies from Pixar, DreamWorks, and Blue Sky. Today, almost all the pictures we encounter are digital--mediated by the pixel and irretrievably separated from their media; museums and kindergartens are two of the last outposts of the analog. Smith explains, engagingly and accessibly, how pictures composed of invisible stuff become visible--that is, how digital pixels convert to analog display elements. Taking the special case of digital movies to represent all of Digital Light (his term for pictures constructed of pixels), and drawing on his decades of work in the field, Smith approaches his subject from multiple angles--art, technology, entertainment,

business, and history. A Biography of the Pixel is essential reading for anyone who has watched a video on a cell phone, played a videogame, or seen a movie.

This book, authored by an array of internationally recognised researchers, is of direct relevance to all those involved in Academia and Industry wanting to obtain insights into the topics at the forefront of the revolution in Artificial Intelligence and Cognitive Science.

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This textbook presents a thorough foundation to the theory of computation. Combining intuitive descriptions and illustrations with rigorous arguments and detailed proofs for key topics, the logically structured discussion guides the reader through the core concepts of automata and languages, computability, and complexity of computation. Topics and features: presents a detailed introduction to the theory of computation, complete with concise explanations of the mathematical prerequisites; provides end-of-chapter problems with solutions, in addition to chapter-opening summaries and numerous examples and definitions throughout the text; draws upon the author's extensive teaching experience and broad research interests; discusses finite automata, context-free languages, and pushdown automata; examines the concept, universality and limitations of the Turing machine; investigates computational complexity based on Turing machines and Boolean circuits, as well as the notion of NP-completeness.

Provides an expansion of Turing's original paper, a brief look at his life, and information on the Turing machine and computability topics.

First Published in 1996. Routledge is an imprint of Taylor & Francis, an informa company.

The Turing Test gives the most comprehensive, in depth and contemporary assessment of this classic topic in artificial intelligence. This is the first book to elaborate in such detail the numerous conflicting points of view on many aspects of this multifaceted, controversial subject. It offers new insights into Turing's own interpretation and traces the history of the debate about the merits of the Turing test in more detail than anywhere else. Turing's famous predictions (1950) are assessed fifty years after they were made. The book also gives competing views about how the Turing test should be interpreted, and novel contemporary criticisms of the test. Justifications for the test and its future applications are suggested and alternatives to the Turing test are examined in detail. Recent results of the Loebner competition are analyzed. This highly readable volume is essential reading for research on the Turing test and for teaching undergraduate and graduate students in philosophy, computer science, and cognitive science.

Alan Turing ranks as one of the most brilliant of twentieth-century mathematicians. He is perhaps best known as one of the founding fathers of two fields of mathematics with enormous implications in the modern world: computer science and artificial intelligence. In addition, Turing's work in decoding the German spy machine known as the Enigma was arguably one of the most important accomplishments in bringing World War II to a successful conclusion for the United States, Great Britain, and their Allies.

This Third Edition is the first English-language edition of the award-winning Meilensteine der Rechentechnik; illustrated in full color throughout in two volumes. The Third Edition is devoted to both analog and digital computing devices, as well as the world's most magnificient historical automatons and select scientific instruments (employed in astronomy, surveying, time measurement, etc.). It also features detailed instructions for analog and digital mechanical calculating machines and instruments, and is the only such historical book with comprehensive technical glossaries of terms not found in print or in online dictionaries. The book also includes a very extensive bibliography based on the literature of numerous countries around the world. Meticulously researched, the author conducted a worldwide survey of science, technology and art museums with their main holdings of analog and digital calculating and computing machines and devices, historical automatons and selected scientific instruments in order to describe a broad range of masterful technical achievements. Also covering the history of mathematics and computer science, this work documents the cultural heritage of technology as well.

Lectures, scientific papers, top secret wartime material, correspondence, and broadcasts are introduced and set in context by Jack Copeland, Director of the Turing Archive for the History of Computing."--Jacket.

Rev. ed. of: Alan Turing's automatic computing engine / edited by B. Jack Copeland.

The Test Drive deals with the war perpetrated by highly determined reactionary forces on science and research. How does the government at once promote and prohibit scientific testing and undercut the importance of experimentation? To what extent is testing at the forefront of theoretical and practical concerns today? Addressed to those who are left stranded by speculative thinking and unhinged by cognitive discourse, The Test Drive points to a toxic residue of uninterrogated questions raised by Nietzsche, Husserl and Derrida. Ranging from the scientific probe to modalities of testing that include the limits of friendship or love, this work explores the crucial operations of an uncontestable legitimating machine. Avital Ronell offers a tour-de-force reading of legal, pharmaceutical, artistic, scientific, Zen, and historical grids that depend upon different types of testability, involving among other issues what it means to put oneself to the test.

Social research is a bourgeoning field. Of course it has many traditions and approaches, but there is a high premium upon thinking differently and thinking anew because social life is never static or wholly predictable. The Handbook, edited by internationally recognized scholars, provides a comprehensive, pitch-perfect critical assessment of the field. The main features of the Handbook are: Clear organization into 4 parts dealing with The Social Context of Research; Design and Data Collection; Integrating The Analysis of New Data Types; Sampling, Inference and Measurement Clear, cutting edge chapters on Objectivity; Causation; Organizing Social Research; Correspondence Analysis; Grounded Theory; Conversational Surveys; Mixed Methods; Meta-Analysis; Optimal Matching Analysis; GIS Analysis; Quantitative Narrative Analysis; Longitudinal Studies; SEM; MLM; Qualitative Comparative Analysis; Respondent Driven Sampling Brings together a glittering assembly of the key figures working in the field of research methods Demonstrates the continuities and productive tensions between classical traditions and real world research. The result is a superbly organized text which will be required reading for anyone interested in the routes and future of social research. It is an unparalleled teaching resource and a 'must have' for serious social researchers.

Historical and contemporary papers on the philosophical issues raised by the Turing Test as a criterion for intelligence. The Turing Test is part of the vocabulary of popular culture—it has appeared in works ranging from the Broadway play "Breaking the Code" to the comic strip "Robotman." The writings collected by Stuart Shieber for this book examine the profound philosophical issues surrounding the Turing Test as a criterion for intelligence. Alan Turing's idea, originally expressed in a 1950 paper titled "Computing Machinery and Intelligence" and published in the journal Mind, proposed an "indistinguishability test" that compared artifact and person. Following Descartes's dictum that it is the ability to speak that distinguishes human from beast, Turing proposed to test whether machine and person were indistinguishable in regard to verbal ability. He was not, as is often assumed, answering the question "Can machines think?" but proposing a more concrete way to ask it. Turing's proposed thought experiment encapsulates the issues that the writings in The Turing Test define and discuss. The first section of the book contains writings by philosophical precursors, including Descartes, who first proposed the idea of indistinguishablity tests. The second section contains all of Turing's writings on the Turing Test, including not only the Mind paper but also less familiar ephemeral material. The final section opens with responses to Turing's paper published in Mind soon after it first appeared. The bulk of this section, however, consists of papers from a broad spectrum of scholars in the field that directly address the issue of the Turing Test as a test for intelligence. Contributors John R. Searle, Ned Block, Daniel C. Dennett, and Noam Chomsky (in a previously unpublished paper). Each chapter is introduced by background material that can also be read as a self-contained essay on the Turing Test Artificial intelligence (AI) is a field within computer science that is attempting to build enhanced intelligence into computer systems. This book traces the history of the subject, from the early dreams of eighteenth-century (and earlier) pioneers to the more successful work of today's AI engineers. AI is becoming more and more a part of everyone's life. The technology is already embedded in face-recognizing cameras, speech-recognition software, Internet search engines, and health-care robots, among other applications. The book's many diagrams and easy-to-understand descriptions of AI programs will help the casual reader gain an understanding of how these and other AI systems actually work. Its thorough (but unobtrusive) end-of-chapter notes containing citations to important source materials will be of great use to AI scholars and researchers. This book promises to be the definitive history of a field that has captivated the imaginations of scientists, philosophers, and writers for centuries.

Mathematics has for centuries been stimulated, financed and credited by military purposes. Some mathematical thoughts and mathematical technology have also been vital in war. During World War II mathematical work by the Anti-Hitler coalition was part of an aspiration to serve humanity and not help destroy it. At present, it is not an easy task to view the bellicose potentials of mathematics in a proper perspective. The book presents historical evidence and recent changes in the interaction between mathematics and the military. It discusses the new mathematically enhanced development of military technology which seems to have changed the very character of modern warfare.

"So is described one of the greatest figures of the twentieth century, yet someone who was barely known beyond mathematical corridors till the revelations in the 1970s. It was then that Alan Turing's critical contributions to the breaking of the German Enigma code, along with the circumstances of his suicide at the height of his powers, became widely known. From the rather odd, precocious, gauche boy through an adolescence in which his mathematical ability began to blossom, to the achievements of his maturity, the story of Turing's life fascinates. In the years since his suicide, Turing's reputation has only grown, as his contributions to logic, mathematics, computing, artificial intelligence and computational biology have become better appreciated. To commemorate the centenary of Turing's birth, this republication of his mother's biography, unavailable for many years, is enriched by a new foreword by Martin Davis and a never-before published memoir by Alan's older brother, which sheds new light on Alan's relationship with his family, and on the man himself"--