Quantum Computing For Computer Scientists English

The Fourth Industrial Revolution
Technology Road Mapping for Quantum Computing and Engineering
Quantum Machine Learning
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Programming the Universe
Introduction to Classical and Quantum Computing
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Quantum Computer Systems: Research for Noisy Intermediate-Scale Quantum Computers
Quantum Computation and Quantum Information
Classical and Quantum Computation
Quantum Computing Since Democritus
Quantum Computing Without Magic
Quantum Mechanics I
Concise Guide to Quantum Computing

Programming Quantum Computers
Quantum Computing for Computer Scientists
Quantum Computing Explained
Quantum Walks for Computer Scientists
Quantum Information, Computation and Communication
Frontiers of Engineering
Quantum Computing
Quantum Computing
Learn Quantum Computing with Python and Q#
An Introduction to Quantum Computing
Programming the Universe
Quantum Information and Quantum Computing
Quest for the Quantum Computer

LANE CARDENAS

The Fourth Industrial Revolution Springer Nature
Based on years of teaching experience, this textbook guides physics undergraduate students through the theory and experiment of the field.
Technology Road Mapping for Quantum Computing and Engineering MIT Press
A self-contained treatment of the fundamentals of quantum computing This clear, practical book takes quantum computing out of the realm of theoretical physics and teaches the fundamentals of the field to students and professionals who have not had training in quantum computing or quantum information theory, including computer scientists, programmers, electrical engineers, mathematicians, physics students, and chemists. The author cuts through the conventions of typical jargon-laden physics books and instead presents the material through his unique "how-to" approach and friendly, conversational style. Readers will learn how to carry out calculations with explicit details and will gain a fundamental grasp of: * Quantum mechanics * Quantum computation * Teleportation * Quantum cryptography * Entanglement * Quantum algorithms * Error correction A number of worked examples are included so readers can see how quantum computing is done with their own eyes, while answers to similar end-of-chapter problems are provided for readers to check their own work as they learn to master the information. Ideal for professionals and graduate-level students alike, Quantum Computing Explained delivers the fundamentals of quantum

computing readers need to be able to understand current research papers and go on to study more advanced quantum texts.

Quantum Machine Learning Cambridge University Press

Finally, a textbook that explains quantum computing using techniques and concepts familiar to computer scientists.

Quantum Computing MIT Press

Quantum computing — the application of quantum mechanics to information — represents a fundamental break from classical information and promises to dramatically increase a computer's power. Many difficult problems, such as the factorization of large numbers, have so far resisted attack by classical computers yet are easily solved with quantum computers. If they become feasible, quantum computers will end standard practices such as RSA encryption.Most of the books or papers on quantum computing require (or assume) prior knowledge of certain areas such as linear algebra or quantum mechanics. The majority of the currently-available literature is hard to understand for the average computer enthusiast or interested layman. This text attempts to teach quantum computing from the ground up in an easily readable way, providing a comprehensive tutorial that includes all the necessary mathematics, computer science and physics.

Quantum Computer Science O'Reilly Media

A thorough exposition of quantum computing and the underlying concepts of quantum physics, with explanations of the relevant mathematics and numerous examples.

Quantum Computer Science Morgan & Claypool Publishers

This book offers an introduction into quantum machine learning research, covering approaches that range from "near-term" to fault-tolerant quantum machine learning algorithms, and from theoretical to practical techniques that help us understand how quantum computers can learn from data. Among the topics discussed are parameterized quantum circuits, hybrid optimization, data encoding, quantum feature maps and kernel methods, quantum learning theory, as well as quantum neural networks. The book aims at an audience of computer scientists and physicists at the graduate level onwards. The second edition extends the material beyond supervised learning and puts a special focus on the developments in near-term quantum machine learning seen over the past few years.

Quantum Computing: An Applied Approach World Scientific Publishing Company

World-renowned economist Klaus Schwab, Founder and Executive Chairman of the World Economic Forum, explains that we have an opportunity to shape the fourth industrial revolution, which will fundamentally alter how we live and work. Schwab argues that this revolution is different in scale, scope and complexity from any that have come before. Characterized by a range of new technologies that are fusing the physical, digital and biological worlds, the developments are affecting all disciplines, economies, industries and governments, and even challenging ideas about what it means to be human. Artificial intelligence is already all around us, from supercomputers, drones and virtual assistants to 3D printing, DNA sequencing, smart thermostats, wearable sensors and microchips smaller than a grain of sand.

But this is just the beginning: nanomaterials 200 times stronger than steel and a million times thinner than a strand of hair and the first transplant of a 3D printed liver are already in development. Imagine “smart factories” in which global systems of manufacturing are coordinated virtually, or implantable mobile phones made of biosynthetic materials. The fourth industrial revolution, says Schwab, is more significant, and its ramifications more profound, than in any prior period of human history. He outlines the key technologies driving this revolution and discusses the major impacts expected on government, business, civil society and individuals. Schwab also offers bold ideas on how to harness these changes and shape a better future—one in which technology empowers people rather than replaces them; progress serves society rather than disrupts it; and in which innovators respect moral and ethical boundaries rather than cross them. We all have the opportunity to contribute to developing new frameworks that advance progress.

Quantum Computing for Everyone Academic Press

A Science journalist reveals the existence of the world's first quantum computer--created by a team of Silicon Valley researchers and able to simultaneously compute all possible solutions to a problem, making it the most powerful computer in the world.

Quantum Computing From The Ground Up Springer Science & Business Media

Is the universe actually a giant quantum computer? According to Seth Lloyd, the answer is yes. All interactions between particles in the universe, Lloyd explains, convey not only energy but also information–in other words, particles not only collide, they compute. What is the entire universe computing, ultimately? “Its own dynamical evolution,” he says. “As the computation proceeds, reality unfolds.” Programming the Universe, a wonderfully accessible book, presents an original and compelling vision of reality, revealing our world in an entirely new light.

Programming the Universe Springer Nature

Takes students and researchers on a tour through some of the deepest ideas of maths, computer science and physics.

Introduction to Classical and Quantum Computing Quantum Computing for Computer Scientists

Quantum computers are poised to kick-start a new computing revolution—and you can join in right away. If you’re in software engineering, computer graphics, data science, or just an intrigued computerphile, this book provides a hands-on programmer’s guide to understanding quantum computing. Rather than labor through math and theory, you’ll work directly with examples that demonstrate this technology’s unique capabilities. Quantum computing specialists Eric Johnston, Nic Harrigan, and Mercedes Gimeno-Segovia show you how to build the skills, tools, and intuition required to write quantum programs at the center of applications. You’ll understand what quantum computers can do and learn how to identify the types of problems they can solve. This book includes three multichapter sections: Programming for a QPU—Explore core concepts for programming quantum processing units, including how to describe and manipulate qubits and how to perform quantum teleportation. QPU Primitives—Learn

algorithmic primitives and techniques, including amplitude amplification, the Quantum Fourier Transform, and phase estimation. QPU Applications—Investigate how QPU primitives are used to build existing applications, including quantum search techniques and Shor’s factoring algorithm.

Machine Learning with Quantum Computers Springer Nature

An accessible introduction to an exciting new area in computation, explaining such topics as qubits, entanglement, and quantum teleportation for the general reader. Quantum computing is a beautiful fusion of quantum physics and computer science, incorporating some of the most stunning ideas from twentieth-century physics into an entirely new way of thinking about computation. In this book, Chris Bernhardt offers an introduction to quantum computing that is accessible to anyone who is comfortable with high school mathematics. He explains qubits, entanglement, quantum teleportation, quantum algorithms, and other quantum-related topics as clearly as possible for the general reader. Bernhardt, a mathematician himself, simplifies the mathematics as much as he can and provides elementary examples that illustrate both how the math works and what it means. Bernhardt introduces the basic unit of quantum computing, the qubit, and explains how the qubit can be measured; discusses entanglement—which, he says, is easier to describe mathematically than verbally—and what it means when two qubits are entangled (citing Einstein's characterization of what happens when the measurement of one entangled qubit affects the second as “spooky action at a distance”); and introduces quantum cryptography. He recaps standard topics in classical computing—bits, gates, and logic—and describes Edward Fredkin's ingenious billiard ball computer. He defines quantum gates, considers the speed of quantum algorithms, and describes the building of quantum computers. By the end of the book, readers understand that quantum computing and classical computing are not two distinct disciplines, and that quantum computing is the fundamental form of computing. The basic unit of computation is the qubit, not the bit.

Explorations in Quantum Computing World Scientific

This book targets computer scientists and engineers who are familiar with concepts in classical computer systems but are curious to learn the general architecture of quantum computing systems. It gives a concise presentation of this new paradigm of computing from a computer systems' point of view without assuming any background in quantum mechanics. As such, it is divided into two parts. The first part of the book provides a gentle overview on the fundamental principles of the quantum theory and their implications for computing. The second part is devoted to state-of-the-art research in designing practical quantum programs, building a scalable software systems stack, and controlling quantum hardware components. Most chapters end with a summary and an outlook for future directions. This book celebrates the remarkable progress that scientists across disciplines have made in the past decades and reveals what roles computer scientists and engineers can play to enable practical-scale quantum computing.

Elements of Quantum Computing Oxford

University Press
In the 1990's it was realized that quantum physics has some spectacular applications in computer science. This book is a concise introduction to quantum computation, developing the basic elements of this new branch of computational theory without assuming any background in physics. It begins with an introduction to the quantum theory from a computer-science perspective. It illustrates the quantum-computational approach with several elementary examples of quantum speed-up, before moving to the major applications: Shor's factoring algorithm, Grover's search algorithm, and quantum error correction. The book is intended primarily for computer scientists who know nothing about quantum theory, but will also be of interest to physicists who want to learn the theory of quantum computation, and philosophers of science interested in quantum foundational issues. It evolved during six years of teaching the subject to undergraduates and graduate students in computer science, mathematics, engineering, and physics, at Cornell University.

Quantum Walks for Computer Scientists
Simon and Schuster
Quantum computation, one of the latest joint ventures between physics and the theory of computation, is a scientific field whose main goals include the development of hardware and algorithms based on the quantum mechanical properties of those physical systems used to implement such algorithms. Solving difficult tasks (for example, the Satisfiability Problem and other NP-complete problems) requires the development of sophisticated algorithms, many ofwhich employ stochastic processes as their mathematical basis. Discrete random walks are a popular choice among those stochastic processes. Inspired on the success of discrete random walks in algorithm development, quantum walks, an emerging field of quantum computation, is a generalization of random walks into the quantum mechanical world. The purpose of this lecture is to provide a concise yet comprehensive introduction to quantum walks. Table of Contents: Introduction / Quantum Mechanics / Theory of Computation / Classical Random Walks / Quantum Walks / Computer Science and Quantum Walks / Conclusions

Supervised Learning with Quantum Computers Cambridge University Press
"Quantum computation, one of the latest joint ventures between physics and the theory of computation, is a scientific field whose main goals include the development of hardware and algorithms based on the quantum mechanical properties of those physical systems used to implement such algorithms." "Solving difficult tasks (for example, the Satisfiability Problem and other NP-complete problems) requires the development of sophisticated algorithms, many of which employ stochastic processes as their mathematical basis. Discrete random walks are a popular choice among those stochastic processes." "Inspired on the success of discrete random walks in algorithm development, quantum walks, an emerging field of quantum computation, is a generalization of random walks into the quantum mechanical world." "The purpose of this lecture is to provide a concise yet comprehensive introduction to quantum walks."--BOOK JACKET.

Will We Ever Have a Quantum Computer?

National Academies Press
By the year 2020, the basic memory components of a computer will be the size of individual atoms. At such scales, the current theory of computation will become invalid. "Quantum computing" is reinventing the foundations of computer science and information theory in a way that is consistent with quantum physics - the most accurate model of reality currently known. Remarkably, this theory predicts that quantum computers can perform certain tasks breathtakingly faster than classical computers – and, better yet, can accomplish mind-boggling feats such as teleporting information, breaking supposedly "unbreakable" codes, generating true random numbers, and communicating with messages that betray the presence of eavesdropping. This widely anticipated second edition of Explorations in Quantum Computing explains these burgeoning developments in simple terms, and describes the key technological hurdles that must be overcome to make quantum computers a reality. This easy-to-read, time-tested, and comprehensive textbook provides a fresh perspective on the capabilities of quantum computers, and supplies readers with the tools necessary to make their own foray into this exciting field. Topics and features: concludes each chapter with exercises and a summary of the material covered; provides an introduction to the basic mathematical formalism of quantum computing, and the quantum effects that can be harnessed for non-classical computation; discusses the concepts of quantum gates, entangling power, quantum circuits, quantum Fourier, wavelet, and cosine transforms, and quantum universality, computability, and complexity; examines the potential applications of quantum computers in areas such as search, code-breaking, solving NP-Complete problems, quantum simulation, quantum chemistry, and mathematics; investigates the uses of quantum information, including quantum teleportation, superdense coding, quantum data compression, quantum cloning, quantum negation, and quantum cryptography; reviews the advancements made towards practical quantum computers, covering developments in quantum error correction and avoidance, and alternative models of quantum computation. This text/reference is ideal for anyone wishing to learn more about this incredible, perhaps "ultimate," computer revolution. Dr. Colin P. Williams is Program Manager for Advanced Computing Paradigms at the NASA Jet Propulsion Laboratory, California Institute of Technology, and CEO of Xtreme Energetics, Inc. an advanced solar energy company. Dr. Williams has taught quantum computing and quantum information theory as an acting Associate Professor of Computer Science at Stanford University. He has spent over a decade inspiring and leading high technology teams and building business relationships with and Silicon Valley companies. Today his interests include terrestrial and Space-based power generation, quantum computing, cognitive computing, computational material design, visualization, artificial intelligence, evolutionary computing, and remote olfaction. He was formerly a Research Scientist at Xerox PARC and a Research Assistant to Prof. Stephen W. Hawking, Cambridge University.
Quantum Computing for Babies American Mathematical Soc.

One of the most cited books in physics of all time, Quantum Computation and Quantum Information remains the best textbook in this exciting field of science. This 10th anniversary edition includes an introduction from the authors setting the work in context. This comprehensive textbook describes such remarkable effects as fast quantum algorithms, quantum teleportation, quantum cryptography and quantum error-correction. Quantum mechanics and computer science are introduced before moving on to describe what a quantum computer is, how it can be used to solve problems faster than 'classical' computers and its real-world implementation. It concludes with an in-depth treatment of quantum information. Containing a wealth of figures and exercises, this well-known textbook is ideal for courses on the subject, and will interest beginning graduate students and researchers in physics, computer science, mathematics, and electrical engineering.

Dancing with Qubits Springer Science & Business Media

A quantum computer is a computer based on a computational model which uses quantum mechanics, which is a subfield of physics to study phenomena at the micro level. There has been a growing interest on quantum computing in the 1990's and some quantum computers at the experimental level were recently implemented. Quantum computers enable super-speed computation and can solve some important problems whose solutions were regarded impossible or intractable with traditional computers. This book provides a quick introduction to quantum computing for readers who have no backgrounds of both theory of computation and quantum mechanics. “Elements of Quantum Computing” presents the history, theories and engineering applications of quantum computing. The book is suitable to computer scientists, physicists and software engineers.

Quantum Computer Systems: Research for Noisy Intermediate-Scale Quantum Computers Vintage

Is the universe actually a giant quantum computer? According to Seth Lloyd, the answer is yes. All interactions between particles in the universe, Lloyd explains, convey not only energy but also information–in other words, particles not only collide, they compute. What is the entire universe computing, ultimately? “Its own dynamical evolution,” he says. “As the computation proceeds, reality unfolds.” Programming the Universe, a wonderfully accessible book, presents an original and compelling vision of reality, revealing our world in an entirely new light.

• Brown Bear, Brown Bear, What Do You See?
• American Prometheus: The Triumph And Tragedy Of J. Robert Oppenheimer
• The Seven Husbands Of Evelyn Hugo: A Novel
• Fourth Wing (the Empyrean, 1)
• Fahrenheit 451
• We'll Always Have Summer (the Summer I Turned Pretty)