

Hidary

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Quantum Computing: An Applied Approach

2nd Ed.

Quantum Computing: An Applied Approach

Second Edition



Springer

Online Site for Quantum Computing: An Applied Approach

Welcome to the online site for *Quantum Computing: An Applied Approach* published by Springer. The Second Edition is now available in both kindle and hardcover versions!

Here is the link to the hardcover and kindle versions on Amazon.

You will find a number of resources on this github site including: - Problem sets (the problem sets apply to both the first and second editions) - Code for the algorithms discussed in the book - Links to further resources - Updates to the book

Problem Sets

- Chapter 1
- Chapter 2
- Chapter 3
- Chapter 4
- Chapter 5
- Chapter 8
- Chapter 9

Additional problem sets for others chapters coming soon.

The problem sets have been developed by: Jack Hidary, Ryan Larose, Stefan Leichenauer and James Myers. If you would like to contribute additional problems let us know! This is for the whole community. jack@hidary.com

For faculty using the book as a course textbook please email jack@hidary.com for solutions.

Further Resources

Recordings from Google's Cirq Bootcamp on May 10 - 11, 2019

Notebooks

- Intro to writing quantum algorithms in Cirq
- Quantum simulation of electronic structure
- Textbook algorithms in Cirq

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- Quantum Approximate Optimization Algorithm - QAOA
 - Neutral atom device class
 - Ion device class

Presentations

- Quantum computing refresher
- Intro to quantum hardware
- Cirq ion trap demo
- Cirq workshop

Zoos * The Quantum Protocol Zoo * Quantum Algo Zoo * Complexity Zoo

Book Reviews

“Quantum computer programming was until recently a completely theoretical enterprise. Now, rapid advances in quantum computing hardware have generated a new wave of interest in both academia and industry in programming these machines. Quantum Computing: An Applied Approach is for this new wave. Emphasizing the nuts and bolts of quantum computing, the textbook covers APIs for multiple platforms including Google, IBM, Microsoft and Rigetti. Author Jack Hidary guides readers through a range of examples from introductory programs all the way to Shor’s factoring algorithm; the textbook also covers applications that may prove useful in the nearer term and are the subject of active research in the field. For coursework, this book is an excellent practical complement to venerable classics such as Nielsen & Chuang that teach the field’s sometimes-daunting theoretical underpinnings. Hidary’s textbook will enable researchers and engineers to quickly ramp up in this emerging field.”

– Patrick Hayden, Professor of Physics, Stanford University

“This is the best book for a course in quantum computing that I have seen. It gives straightforward explanations of the foundations, history, and hardware, and it walks through executable code for many important algorithms. Additionally, the book brings the reader up to speed with all the math that is needed. I plan to use the book in my course on quantum programming.”

– Jens Palsberg, Professor of Computer Science, UCLA

“Hidary’s ‘Quantum computing: An Applied Approach’ provides a welcome bridge from traditional quantum computing texts to the NISQ era which we are now entering. The book takes a modern approach, following the treatment of each of the canonical algorithms with coded versions that can be run on actual quantum computers, along with a survey of various code libraries developed for this purpose. It continues with an overview of state-of-the-art variational and optimization methods such as VQE and QAOA, and a discussion, again with code, of random circuit sampling, the forefront application expected to provide a first realization of quantum supremacy. The book has a companion

website for updates and ongoing addition of new resources and developments. By building on the substantial progress of the past five years, this book and its associated resources will facilitate the transition from how quantum computers might be used in principle to how they'll probably be used in practice over the next decade."

– Paul Ginsparg, Professor of Physics, Cornell University

"This book fills a gap in the literature on quantum computing. It is a welcome tool for training and reference with numerous practical code examples, arriving just in time for researchers and engineers in both academia and industry ready to get their hands dirty with programming quantum computers."

– Dennis Willsch, Jülich Supercomputing Centre

Contact

Please email us at jack@hidary.com or jtricot1@gmail.com with comments and suggestions!

Jack