Paul T. Pham

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3601 Corliss Ave N
Seattle, WA 98103

Education

University of Washington (UW)
Doctor of Philosophy in Computer Science — September 2013
Thesis: *Low-depth quantum architectures for factoring*. Advised by Aram Harrow and Dave Bacon.

Massachusetts Institute of Technology (MIT)
Master of Engineering in Electrical Engineering & Computer Science, February 2005.
Thesis: *A general-purpose pulse sequencer for quantum computing*. Advised by Isaac Chuang

Bachelor of Science in Electrical Engineering and Computer Science, June 2004.

Employment & Teaching Experience

CodeFellows — Seattle, Washington

Instructor — March 2015—Present

Foundations of Computer Science and Web Development — April —May 2015

Python Foundations II — March—April 2015, June—July 2015, September—October 2015

The Evergreen State College — Olympia, Washington

Tenure-Track Member of the Faculty — September 2013—September 2014

Programming as a Way of Life — Fall 2013—Spring 2014

Design of Computational Things — Spring 2014

UW Computer Science & Engineering Dept. — Seattle, Washington

Instructor

Quantum Computing for Beginners (CSE 490Q) — September 2012—Present
An original course to teach the basics of quantum computing and D-Wave programming.

Teaching Assistant

Advanced Internet Services (CSE 454) — January 2012—March 2012
Professor Oren Etzioni

The Hardware/Software Interface (CSE 351) — April—June 2010
Professor Gaetano Borriello

Data Structures (CSE 326) — September—December 2006
Professor Larry Snyder

Software Development Tools (CSE 303) — April—June 2006
Professor Magda Balazinska

Algorithms (CSE 417) — January—March 2006
Professor Larry Ruzzo

Discrete Structures Class (CSE 321) — September—December 2005
Professors Dieter Fox & Anna Karlin

Publications

A 2D nearest-neighbor quantum architecture for factoring.
P. Pham, K.M. Svore. `http://arxiv.org/abs/1207.6655`
Reversible Computation Workshop, June 2012 Copenhagen, Denmark

Quantum compiling single-qubit gates with the Kitaev-Shen-Vyalyi procedure.
P. Pham
Ph.D. qualifying examination report.

Component-based invisible computing.
A. Forin, J. Helander, **P. Pham**, J. Rajendiran.
IEEE Realtime Embedded Systems Workshop, December 2001 London, UK

Posters

A 2D quantum architecture for factoring in sub-quadratic depth.
P. Pham
Quantum Information Processing (QIP) Conference, December 2011.

Quantum compiling with Kitaev-Shen-Vyalyi.
P. Pham
Southwest Quantum Information and Technology (SQuInT), February 2011.

Adiabatic shelving to the $5D_{5/2}$ state in trapped barium ions.
R. McClure, J. Booth, **P. Pham**, J. Wright, T. Noel, B. Blinov
Southwest Quantum Information and Technology (SQuInT), February 2011.

Patents

Method and system for managing the execution of threads and data processing.
A. Forin, J. Helander, **P. Pham**.
U.S. Patent No. 7,246,353
Filed on June 12, 2002. Granted on July 17, 2007.

Invited Talks

University of Puget Sound Tacoma, Washington
The mathematics of quantum computing November 2013
Hosted by Prof. Carl Toews.

University of British Columbia Vancouver, Canada
Quantum architecture, compiling, and 2D factoring September 2012
Hosted by Prof. Robert Raussendorf.

University of Innsbruck Innsbruck, Austria
Quantum architecture, compiling, and 2D factoring July 2012
Hosted by Prof. Rainer Blatt.

University of Freiburg Freiburg, Germany
Quantum architecture, compiling, and 2D factoring July 2012
Hosted by Prof. Tobias Schätz.

University of Aarhus Aarhus, Denmark
Quantum architecture, compiling, and 2D factoring July 2012
Hosted by Prof. Michael Drewsen.

Students Mentored

UW Computer Science & Engineering Dept. Seattle, WA

Noah Siegel September 2012—Present
Improving the exponential dimensional dependence in the quantum compiling procedure of Kitaev, Shen, Vyalyi.

Andrea McCool June 2010—Present
Mapping Shor's algorithm to a nearest-neighbor 2D quantum architecture in constant circuit depth.

Jeffrey Booth, Jr. January 2010—May 2012
Honors senior thesis. Meet-in-the-middle optimizations for a quantum compiler.

Harshad Petwe June 2010—August 2011
Constructing a programmable pulse generator for controlling trapped atomic ions in quantum information processing experiments at the Max Planck Institute for Quantum Optics.

Rob McClure January 2010—March 2011
John Williams January 2010—May 2010
David Nufer January 2010—May 2010
Extending a programmable pulse generator for controlling trapped atomic ions to perform adiabatic shelving of electron energy states in the UW Physics Department.

Activities

MIT ACM/IEEE Programming Competition Cambridge, Massachusetts
Contest Chair, Lead Developer, Organizer 2001-2003

`http://www.battlecode.org`
`http://web.mit.edu/ieee/6.370/2003/web/`
Created a long-running programming competition for distributed software agents to play a a real-time strategy game. Winning student competitors were matched with corporate sponsors which now include Dropbox, Blizzard Entertainment, Amazon, Google, Oracle, D.E. Shaw, and Akamai.

Software

Pulse Programmer SourceForge
Project Admin, Lead Developer January 2005—Present
`http://pulse-programmer.org`
Built an open source reconfigurable radio-frequency signal generator for quantum computing and quantum information processing experiments. In use at eight experimental trapped ion research groups around the world.

Quantum Compiler SourceForge, Github
Project Admin, Lead Developer January 2005—Present
`http://quantum-compiler.org`
Developed an open source code in Python and NumPy to implement the Solovay-Kitaev quantum compiling algorithm for generic, multi-qubit gates in SU(d). Simulated the Kitaev-Shen-Vyalyi quantum compiling algorithm in QCL and wrote code to measure its required resources. Accepted as qualifying examination project in the UW CSE Ph.D. program.

Awards

Max E. Gellert Fellowship 2005-2006
University of Washington, College of Engineering Seattle, WA

Research Experience

Microsoft Research — Seattle, WA
Research Intern — June—August 2011
Quantum Architectures and Computation Group
Mentor: Krysta Svore
Designed a 2D nearest-neighbor quantum architecture for period-finding with depth $O(L \log L)$ for factoring an L-bit integer. Pending patent application.

University of Washington Dept. of Physics and Astronomy — Seattle, WA
Graduate Research Assistant — January—July 2007, May—June 2010
Trapped Ion Quantum Computing Group
Advisor: Prof. Boris Blinov
Built a programmable radio-frequency system for ion trap control including photomultiplier tube input counting.

Max Planck Institute for Quantum Optics — Garching, Germany
Visiting Ph.D. Student — July 2005—August 2005
Quantum Analog Simulation Group
Advisor: Dr. Tobias Schätz
Built a programmable radio-frequency system for ion trap control with phase-coherent frequency-switching.

University of Innsbruck — Innsbruck, Austria
Visiting Ph.D. Student — February 2005—June 2005
Quantum Optics and Spectroscopy Group
Advisor: Univ. Prof. Rainer Blatt
Built a programmable radio-frequency system for ion trap control with shaped amplitudes.

MIT Center for Bits and Atoms — Cambridge, Massachusetts
Graduate Research Assistant — September 2003—January 2005
quanta Research Group
Advisor: Prof. Isaac Chuang
Designed and built instrumentation for quantum computing experiments.

Microsoft Research — Redmond, WA
Research Intern — June 2001—September 2001
Invisible Computing Group — June 2003—August 2003
Mentors: Alessandro Forin, Johannes Helander
Added work items to the scheduler of an embedded real-time kernel. Designed and assembled the electronics for a wireless sensor demo.

Work Experience

Amazon.com — Seattle, WA
Software Development Engineer — January 2008—June 2009
Endless.com Designer Shoes and Handbags
Manager: Doug Irvine
Maintained a large-scale, high-availability retail website built using Apache Tomcat, J2EE, the Spring dependency-injection framework, jQuery, and Ajax. Implemented a pipeline for customers to write product reviews.

References

Richard Weiss
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The Evergreen State College
2700 Evergreen Parkway NW, Lab II 3260
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E-mail: weissr@evergreen.edu

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Tobias Schätz
Assistant Professor
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D-85748 Garching, Germany
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