Thomas Propson

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EDUCATION

Massachusetts Institute of Technology   2021–2026
Ph.D. Electrical Engineering

The University of Chicago   2017–2021
B.A. Physics (summa cum laude), Minor Computer Science

RESEARCH EXPERIENCE

Experimental Control of Superconducting Qubits   2019–2021
The University of Chicago Department of Physics, Advisor: David I. Schuster
- Developed numerical techniques using control theory and trajectory optimization to engineer high fidelity quantum gates in the presence of decoherence and systematic errors
- Performed calibration, control, and readout on superconducting qubits

Quantum Hardware and Algorithm Optimization   2018–2019
The University of Chicago Department of Computer Science, Advisor: Frederic T. Chong
- Developed a method for compiling variational quantum algorithms that achieves a 30x latency reduction
- Developed an operation scheduling algorithm for frequency-tunable qubits that mitigates cross-talk by an order of magnitude
- Investigated properties of near-term quantum hardware and algorithms to optimize quantum architectures for fidelity and latency

Hyperparameter Optimization   2018
Argonne National Laboratory Division of Math and Computer Science
Advisors: Stefan Wild, Prasanna Balaprakash
- Developed a software package to evaluate hyperparameter optimization algorithms that exposes a novel search space definition system
- Deployed neural network experiments on high-performance computing infrastructure

PUBLICATIONS

1. **T. Propson**, B. E. Jackson, Z. Manchester, J. Koch, D. I. Schuster, "Robust Quantum Optimal Control with Trajectory Optimization." Phys. Rev. Applied 17(1), 014036 (2022). [arxiv:2103.15716].
2. Y. Ding, P. Gokhale, S. F. Lin, R. Rines, **T. Propson**, F. T. Chong, "Systematic Crosstalk Mitigation for Superconducting Qubits via Frequency-Aware Compilation." Proceedings of the 53rd Annual IEEE/ACM International Symposium on Microarchitecture, 201-214 (2020). [arxiv:2008.09503]
3. P. Gokhale, Y. Ding, **T. Propson**, C. Winkler, N. Leung, Y. Shi, D. I. Schuster, H. Hoffmann, F. T. Chong, "Partial Compilation of Variational Algorithms for Noisy Intermediate-Scale Quantum Machines." Proceedings of the 52nd Annual IEEE/ACM International Symposium on Microarchitecture, 266-278 (2019). [arxiv:1909.07522]

PATENTS

1. P. Gokhale, Y. Ding, **T. Propson**, F. T. Chong, "System and Method for Partial Compilation of Variational Algorithms in Quantum Computers." Intl. App. No. PCT/US2020/049932

Honors and Awards

National Science Foundation Graduate Research Fellowship	2021
Jacobs Presidential Fellowship, MIT EECS	2021
Grainger Scholarship, UChicago Physics, full-tuition senior year	2020
Barry Goldwater Scholarship	2020
Enrico Fermi Scholar, UChicago PSD, major GPA in top 5% from past 5 years	2020
Summer Research Fellowship, UChicago	2019
Liew Family College Research Fellowship, UChicago	2018
Jeff Metcalf Research Fellowship, UChicago	2018
University Scholarship, UChicago	2017–2021

Contributed Talks

Systematic Crosstalk Mitigation for Superconducting Qubits via Frequency-Aware Compilation
- MICRO 53 Conference (virtual), Athens, Greece, 2020

Partial Compilation of Variational Algorithms for Noisy Intermediate-Scale Quantum Machines
- MICRO 52 Conference, Columbus, OH, 2019

Commercial Outlook for Quantum Computing
- The University of Chicago Booth School of Business, Chicago, IL, 2019

Contributed Posters

Benchmarking Hyperparameter Optimization Algorithms on Deep Neural Networks
- The University of Chicago Undergraduate Research Symposium, Chicago, IL, 2018
- Argonne National Laboratory Summer Student Symposium, Lemont, IL, 2018

Outreach

The University of Chicago Department of Physics 2020–2021
- Organize a pre-freshman, summer, physics program for first-generation and limited-income students

Uncommon Hacks 2018–2021
- Organize an annual MLH endorsed hackathon to provide a platform for 300+ students to collaborate with peers, learn technical skills, and develop relationships with employers
- Lead a 10-person team of designers and software developers to build websites that reach 1000+ users

Strive Learning 2018
- Met weekly with students from limited-income households in the Chicago Public Schools to assist with coursework, college applications, and connecting students to extracurricular activities

Teaching

The University of Chicago
- Grader, Winter 2020, CMSC 23300 Networks and Distributed Systems

Work Experience

PanorArt Inc. 2018
Full-Stack Web Developer
- Angular, Node.js, HTTP, relational and non-relational databases, search engine optimization