Thomas Propson

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Education

The University of Chicago 2017–2021
B.A. Physics, Minor Computer Science
GPA: 3.89 / 4.0

Research Experience

Experimental Control of Superconducting Qubits 2019–Present
University of Chicago Department of Physics, Advisor: David I. Schuster

- Perform calibration, control, and readout on superconducting qubits
- Develop numerical techniques using control theory and trajectory optimization to engineer high fidelity quantum gates in the presence of decoherence and systematic errors

Quantum Hardware and Algorithm Optimization 2018–2019
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. Jackson, Z. Manchester, D. I. Schuster, "Robust Control of a Fluxonium Qubit." In preparation (2020).
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." Pending.

Honors and Awards

Grainger Scholarship, Full-Tuition Senior Year, UChicago Physics 2020
Barry Goldwater Scholarship 2020
Enrico Fermi Scholar, Major GPA in top 5% from past 5 years, UChicago PSD 2020
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
University of Chicago Booth School of Business, Chicago, IL, 2019

Contributed Posters

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

Outreach

University of Chicago Department of Physics 2020–Present
- Organize a pre-freshman, summer, physics program for students from limited-income households

Uncommon Hacks 2018–Present
- 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

Work Experience

PanorArt Inc. 2018
Full-Stack Web Developer
- Built front-end web components using Angular.js to provide users with a platform to buy and sell art that achieves greater price transparency than competing platforms
- Improved online presence by implementing search engine optimization techniques
- Developed a production server in Node.js to communicate with clients via HTTP and manage databases