Alex Fischer

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Education

Master's degree (PhD ongoing): University of New Mexico   August 2022–present

- Physics master's degree May 2024, PhD ongoing.

- In Center for Quantum Information and Control (CQuIC)

Bachelor's degree: University of Massachusetts, Amherst   September 2016–May 2020

- Graduated with 2 Bachelor of Science degrees in Computer Science and Pure Mathematics.

- GPA: 3.98.

Publications

[1] Alex Fischer and Akimasa Miyake. "Hardness results for decoding the surface code with Pauli noise". Quantum **8**, 1511 (2024). arXiv:2309.10331.

[2] Samyadeep Basu, Amr Sharaf, Karine Ip Kiun Chong, Alex Fischer, Vishal Rohra, Michael Amoake, Hazem El-Hammamy, Ehi Nosakhare, Vijay Ramani, and Benjamin Han. "Strategies to improve few-shot learning for intent classification and slot-filling". In Proceedings of the Workshop on Structured and Unstructured Knowledge Integration (SUKI). Pages 17–25. (2022). arXiv:2109.08754.

[3] Alex Fischer and Don Towsley. "Distributing graph states across quantum networks". In 2021 IEEE International Conference on Quantum Computing and Engineering (QCE). Pages 324–333. IEEE (2021). arXiv:2009.10888.

[4] David Balaban, Alexander Fischer, and Joydeep Biswas. "A real-time solver for time-optimal control of omnidirectional robots with bounded acceleration". In 2018 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS). Pages 8027–8032. IEEE (2018). arXiv:1707.04617.

Talks given

- 2024 APS March Meeting, contributed talk, "Hardness results for decoding the surface code with Pauli noise".

- 2021 IEEE Conference on Quantum Computing and Engineering (QCE21), technical paper talk, "Distributing graph states across quantum networks".

- 2020 Workshop on Quantum Network Science (NetSci 2020 satellite workshop), flash talk, "'Distributing graph states across quantum networks".

Research experience

Akimasa Miyake Research Group, University of New Mexico   January 2023–present

- Researching quantum error correction.

- Published paper about the computational complexity of surface code decoding. On the arXiv, and currently under review at a journal.

- Presented work at 2024 APS March Meeting contributed talk, and at 2023 Southwest Quantum Information & Technology Workshop (SQuInT) poster session.

Quantum Networking Group, University of Massachusetts Amherst   January 2020–October 2021

- Devised new algorithm for preparing graph states in a quantum network.

- Proved our algorithm has better performance than that of prior work on the same problem.

- Work appeared as paper in 2021 IEEE International Conference on Quantum Computing and Engineering (QCE2021), in poster session of QCE2020, and in flash talk in Workshop on Quantum Network Science (NetSci 2020 Satellite Workshop).

Autonomous Mobile Robotics Laboratory, University of Massachusetts Amherst   January 2018–May 2019

- Modified novel control algorithm for time-optimal control of omnidirectional robots to improve algorithm's stability with respect to noisy robot motion.

- Implemented that algorithm in real time on real robots in C++.

- Work appeared as paper (second-author) in International Conference On Intelligent Robots and Systems, 2018.

- Wrote software to automatically calibrate latency values for robot motion.

Research Experience for Undergraduates, University of Miami   Summer 2017

- Wrote software to analyze three dimensional images of mice optic nerves that were multiple gigabytes each, in order to assist medical researchers studying neuron regeneration.

- Implemented novel and existing computer vision algorithms in MATLAB and C++.

- Poster available at cs.miami.edu/reu-cfs/2017/posters/FischerPublicPoster.pdf.

Industry experience

Software Engineer, Microsoft   August 2020–March 2022

- Microsoft AI Development & Acceleration Program (MAIDAP)—a rotation program for new graduates.

- Rotating between different teams every 6 months within Azure cloud computing service.

- Used several different programming languages (C#, Python, Typescript).

Software Engineer Intern, Microsoft   Summer 2019

- Improved an internal tool used to analyze customer satisfaction data gathered from Office 365 customer surveys.

- Full stack development with C# on ASP.NET, SQL, Typescript, and React.

Software Engineer Intern, Microsoft   Summer 2018

- Added features to the Windows photo viewer and to the Photos Companion mobile app.

- Used C# with UWP for the desktop application and C# with Xamarin for the cross-platform mobile application.

- Designed and implemented new network protocol features to improve the photo transfer experience.

Teaching experience

Teaching Assistant, University of New Mexico   August 2022–present

- TA for graduate level physics course 'Mathematical Methods of Physics', fall 2023. I graded homework and held office hours.

- Lab TA for introductory physics courses 'Survey of Physics' and 'Physics of Music', fall 2022 and spring 2023 respectively. I set up and ran lab activities, made and delivered short lectures during lab sessions, and graded lab reports.

Teaching Assistant, University of Massachusetts Amherst   January–December 2017

- TA for 300 level mathematics course 'Fundamental Concepts of Mathematics' (intro to proof-based mathematics), fall 2017. I planned & ran my own discussion sections, held office hours, and graded exams & homework.

- TA for undergraduate level Computer Science course 'Programming with Data Structures', spring 2017. I graded homework.

Grants awarded

Sara Corrie Grants, National Speleological Society, 2023 and 2024

- $1000 grants awarded in 2023 and 2024 by national-level caving organization.

- Grants supported gear, transportation, and food costs for cave exploration expeditions on Prince of Wales Island, Alaska, that I helped organize.

Northern Rocky Mountain Grotto Small Grant, 2023 and 2024

- $500 grants awarded in 2023 and 2024 by regional-level caving organization.

- Grant supported gear, transportation, and food costs for cave exploration expeditions on Prince of Wales Island, Alaska, that I helped organize.