KEVIN YIPU WU

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EDUCATION

University of Washington

2024 - Present (GPA: 3.6/4.0)

Ph.D. Electrical & Computer Engineering

William & Mary

2020 - 2024 (GPA: 3.81/4.0)

B.S. Computer Science and Mathematics Double Major

PUBLICATIONS

[1] Chi-Kwong Li, Kevin Yipu Wu, and Zherui Zhang. *Efficient Circuit-Based Quantum State Tomography via Sparse Entry Optimization*. Under review. 2024. arXiv: 2407.20298 [quant-ph]. URL: https://arxiv.org/abs/2407.20298.

RESEARCH EXPERIENCE

Computer Generated Holography for Generating 3D Reconfigurable Optical Tweezer Arrays

2024 - Now

Advisor: Dr. Maxwell Parsons — *University of Washington*

- Implemented iterative and gradient descent phase reconstruction algorithms to generate multi-layer 3D tweezer arrays using a phase spatial light modulator.
- Training a U-Net encoder-decoder phase reconstruction neural network to generate phase maps for 3D tweezer arrays.
- Implemented a pipeline to characterize 3D trap arrays in an experimental setup.

Improving the Scalability of Neural Network Surface Code Decoders 2023 - 2024

Advisor: Dr. Qun Li — *William & Mary*

- Designed transformer and structured selective state space models to decode the rotated planar code, a type of quantum error correction code.
- Implemented and trained the models using PyTorch to decode low distance rotated planar codes.
- Scaled decoders to higher distance codes using state compression techniques.

Applying Differential Learning to Quantum Federated Learning 2023

Advisor: Dr. Qun Li — *William & Mary*

- Trained a federated QCNN using the Qiskit Machine Learning library, achieving 89% simulator test accuracy and 70% IBM QPU test accuracy on the MNIST dataset.
- Implemented differential privacy to obfuscate sensitive client data, and performed a hyperparameter search to find an appropriate level of privacy.

First AI/ML Challenge at Dahlgren 2022 - 2023

Advisor: Dr. Qun Li — *NSWCDD*

- Contributed to a white paper detailing relevant literature and proposed approaches on the weapon target assignment problem, which resulted in the team's acceptance to the competition.
- Played a leading role in brainstorming and implementing approaches for automatic scheduling and coordination of advanced weapon systems.
- Architected, implemented, and trained several approaches to reduce damage to high value assets, including a Deep Q-Learning agent and heuristic-driven Greedy agent.
- The W&M team won 3rd place and $20,000 in prize money.

Quantum Operator Approximation via Nonconvex PSD Programming 2022

Advisor: Dr. Chi-Kwong Li *William & Mary*

- Approximated arbitrary quantum operators using the Pauli product rotations, exponentiated elements of the Pauli group.
- Transformed problem into nonconvex positive semidefinite programming problem, and optimized using a trust-region approach.

PRESENTATIONS

- Chi-Kwong Li, Kevin Y. Wu, and Zherui Zhang. 2024. Efficient Circuit-Based Quantum State Tomography via Sparse Entry Optimization. Talk: MAO, Reno, Nevada.
- Chi-Kwong Li, Kevin Y. Wu, and Zherui Zhang. 2024. Efficient Circuit-Based Quantum State Tomography via Sparse Entry Optimization. Poster: JMM, San Francisco, CA.

SERVICE

Teaching Assistant September 2024 - Present

- Modified assignments, assignment autograding on Gradescope, and quizzes.
- Graded assignments.
- Held twice weekly office hours.
- Fielded student questions on Slack.

Research/Teaching Assistant June 2024 - Present

Advisor: Dr. Chi-Kwong Li *William & Mary Math Department*

- Authoring a set of class notes that serve as a quick introduction to quantum information science from a linear algebra perspective, used for instructing new students in the field.
- Collaborated with advisor to refine the content, incorporating feedback to improve the clarity and effectiveness of the instructional materials.
- Designed examples and supplementary exercises to reinforce key concepts.

Intern Mentor December 2023 - Present

- *Asian Americans in Energy, Environment, and Commerce (AE2C)*

- Mentoring a high school student intern on the fundamentals of programming and web development.

- Provided guidance on project management, direction, and code quality, ensuring the intern's successful completion of several backend projects.
- Offered advice for improving algorithm performance and code best practices.

Undergraduate Consultant August 2022 - May 2024

Computer Science Consulting *William & Mary*

- Provided assistance to computer science students during the semester by holding office hours twice a week, providing one-on-one support to students.
- Offered advice for debugging code and assignments, covering topics related to data structures and computer science principles.

HONORS

- **AQET Scholar**, *University of Washington AQET Program*, 2024
- **Stephen K. Park Undergraduate Scholarship Award**, $1500, *W&M Computer Science Department*, 2024
- **Phi Beta Kappa**, *Phi Beta Kappa Alpha Chapter of Virginia*, 2023
- **Elias Paparis Scholarship**, $2500, *W&M Computer Science Department*, 2023
- **Robert C. and Muriel M. Jennings Scholarship**, $3500, *Phi Beta Kappa Alpha Chapter of Virginia*, 2023