Kevin Yipu Wu

Doctoral Student · Electrical and Computer Engineering

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Education

University of Washington *Seattle, WA*

Ph.D. Electrical & Computer Engineering *2024 - Present*

William & Mary *Williamsburg, VA*

B.S. Computer Science and Mathematics Double Major *2020 - 2024*

- CS GPA: 3.88/4, GPA: 3.78/4

Professional Experience

ESPX Global Inc. *2024 - Now*

Data Analytics Consultant

- Analyzed electric grid data using Python, AWS services, and SQL.
- Communicated technical details to nontechnical collaborators.

William & Mary *2024*

Research Assistant

- Authoring a set of notes serving as a quick introduction to quantum information science from a mathematical perspective.

Amazon Web Services *2022 - 2023*

Solutions Architect Intern

- Implemented an end-to-end quantum error mitigation scheme, replicating a state-of-the-art result. Used Poisson distributions fit on quantum processor metadata to predict and reduce quantum noise. Constructed a quantum circuit transpilation protocol in Python to aid in this endeavor.
- Investigated relevant literature in cloud quantum computing, quantum error mitigation, and LLM retrieval augmented generation.
- Studied for and achieved the Cloud Practitioner and Associate Solutions Architect AWS Certifications.
- Completed mock customer conversations and shadowed customer calls.

ESPX Global Inc. *2021 - 2022*

Junior Software Developer

- Engineered a data lake solution capturing market conditions and features of the electric grid.
- Agilely collaborated remotely with a team of developers to create a minimum viable product conforming to client expectations.
- Selected, acquired, normalized, and analyzed data using Python, AWS services, and SQL.
- Managed and maintained the company website, along with related SSL certificate.

Asian Americans in Energy, Environment, and Commerce *2022 - 2023*

Student Intern Team Lead

- Interviewed, hired, trained a team of student applicants as team lead.
- Led this team in pushing website updates and updating functionality.
- Mentored and developed interns' technical and professional skills

Publications

Li, Chi-Kwong, Kevin Yipu Wu, and Zherui Zhang (2024). *Efficient Circuit-Based Quantum State Tomography via Sparse Entry Optimization*. Under review.

Awards, Fellowships, & Grants

2024 **AQET Scholar**, University of Washington AQET Program
Stephen K. Park Undergraduate Scholarship Award, W&M Computer Science Department *$ 1500*

2023 **Phi Beta Kappa**, W&M Phi Beta Kappa Chapter
Elias Paparis Scholarship, W&M Computer Science Department *$ 2500*
Robert C. and Muriel M. Jennings Scholarship, W&M Phi Beta Kappa Chapter *$ 3500*

Presentations

Contributed 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.

Research Experience

Computer Generated Holography for Creating Optical Tweezers *University of Washington*
Advisor: Dr. Maxwell Parsons *2024 - Now*

- Implemented iterative phase reconstruction algorithms to generate spot arrays using a phase spatial light modulators, reaching 92% simulated power efficiency.
- Investigating alternative neural network phase reconstruction algorithms for improved power efficiency and trap depth.
- Extending algorithm to 3D trap arrays through wavefront propagation techniques.

Improving the Scalability of Neural Network Surface Code Decoders *William & Mary*
Advisor: Dr. Qun Li *2023 - 2024*

- 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 *William & Mary*
Advisor: Dr. Qun Li *2023*

- 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 *NSWCDD*
Advisor: Dr. Qun Li *2022 - 2023*

- 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 *William & Mary*
Advisor: Dr. Chi-Kwong Li *2022*

- 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.

Outreach & Professional Development

Service and Outreach

2022 - 2024 **W&M CS Department**, Undergraduate CS Consultant