KEVIN YIPU WU

ypwk@uw.edu ◇ ypwk.github.io ◇ Seattle, WA

EDUCATION

University of Washington

2024 - Present

Ph.D. Electrical & Computer Engineering

William & Mary

2020 - 2024

B.S. Computer Science and Mathematics Double Major

PROFESSIONAL EXPERIENCE

Data Analytics Consultant 2024 - Now

McLean, VA *ESPX Global Inc.*

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

Research Assistant 2024

Wiliamsburg, VA *William & Mary*

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

Solutions Architect Intern 2022 - 2023

Seattle, WA *Amazon Web Services*

- 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.

Junior Software Developer 2021 - 2022

McLean, VA *ESPX Global Inc.*

- 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.

Student Intern Team Lead 2022 - 2023

Alexandria, VA *Asian Americans in Energy, Environment, and Commerce*

- 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

[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.

HONORS

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

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 2024 - Now

Advisor: Dr. Maxwell Parsons *University of Washington*

- 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 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.