# MENG WANG

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## SUMMARY

I am currently a 4th-year Ph.D. candidate in Computer Engineering at the University of British Columbia, where my research focuses on practical quantum computing for the NISQ era and beyond. My academic journey has involved building advanced quantum circuit simulators and optimizing the execution efficiency of variational quantum algorithms. During my previous internship at Pacific Northwest National Laboratory, I gained valuable experience in high-performance computing for quantum simulations and also engaged in interdisciplinary collaboration with experts in Chemistry and Physics.

## EDUCATION

**Ph.D in Electrical and Computer Engineering** *September 2020 - Present*
The University of British Columbia Vancouver, BC, Canada
*Advisor: Dr.Prashant Nair*

**BASc in Computer Engineering** *September 2017 - June 2020*
The University of British Columbia Vancouver, BC, Canada
*Graduated with Distinction*

**Associate of Science** *September 2015 - July 2017*
Langara College Vancouver, BC, Canada

## AWARDS

**Faculty of Applied Science Graduate Award** *2021, 2022, 2023, UBC*
*The annual award, subject to annual review and criteria fulfillment.*

**APSC Capstone Faculty Award** *May 2020, UBC*

**Dean's Honour List** *Jun 2019, UBC*

**Special Progressing Award** *Feb 2016, Langara College*

**Entrance Scholarship** *Jul 2015, Langara College*

## CONFERENCE PUBLICATIONS

1. **ASPLOS'24** **Meng Wang**, Bo Fang, Ang Li, and Prashant Nair
*Red-QAOA: Efficient Variational Optimization through Circuit Reduction*
International Conference on Architectural Support for Programming Languages and Operating Systems, 2024

## ARXIV PREPRINTS

1. **Meng Wang**, Swamit Tannu, and Prashant Nair.
*TQSim: a case for reuse-focused tree-based quantum circuit simulation*
arXiv preprint arXiv:2203.13892

2. Chenxu Liu, **Meng Wang**, Samuel A. Stein, Yufei Ding, and Ang Li
*Quantum Memory: A Missing Piece in Quantum Computing Units*
arXiv preprint arXiv:2309.14432

3. Fei Hua, **Meng Wang**, Gushu Li, Bo Peng, Chenxu Liu, Muqing Zheng, Samuel A. Stein, Yufei Ding, Eddy Z Zhang, Travis Humble, and Ang Li.
*QASMTrans: A QASM-based Quantum Transpiler Framework for NISQ Devices*
arXiv preprint arXiv:2308.07581

4. Ang Li, Chenxu Liu, Samuel Stein, In-Saeng Suh, Muqing Zheng, **Meng Wang**, Yue Shi, Bo Fang, Martin Roetteler, and Travis Humble.
*TANQ-Sim: Tensorcore Accelerated Noisy Quantum System Simulation via QIR on Perlmutter HPC*
arXiv preprint arXiv:2404.13184

## WORKSHOP PUBLICATIONS

1. **QCS'23** **Meng Wang**, Fei Hua, Chenxu Liu, Nicholas Bauman, Karol Kowalski, Daniel Claudino, Travis Humble, Prashant Nair, Ang Li
*Enabling Scalable VQE Simulation on Leading HPC Systems*
The International Conference for High Performance Computing, Networking, Storage, and Analysis Workshop: Quantum Computing Softwares, 2023.

2. **QCS'23** Fei Hua, **Meng Wang**, Gushu Li, Bo Peng, Chenxu Liu, Muqing Zheng, Samuel A. Stein, Yufei Ding, Eddy Z Zhang, Travis Humble, and Ang Li.
*QASMTrans: A QASM Quantum Transpiler Framework for NISQ Devices*
The International Conference for High Performance Computing, Networking, Storage, and Analysis Workshop: Quantum Computing Softwares, 2023.

3. **QCCC'23** **Meng Wang**, Bo Fang, Ang Li, and Prashant Nair
*Efficient QAOA Optimization using Directed Restarts and Graph Lookup*
The Second International Workshop on Quantum Classical Cooperative Computing.

## WORK EXPERIENCE

**Pacific Northwest National Laboratory** *October 2022 - August 2023*
Ph.D. Research Intern. Mentor: Ang Li, Bo Fang Richland, WA, USA

- Participated in developing simulation frameworks leveraging leading HPC systems including Frontier, Summit, and Perlmutter to simulate large-scale quantum circuits on GPU clusters. The simulation framework is open-sourced at https://github.com/pnnl/NWQ-Sim.
- Led research improving the efficiency of classical optimization in Quantum Approximated Optimization Algorithm (QAOA), yielding two publications: Red-QAOA (accepted at **ASPLOS'24**) proposing a circuit reduction technique, and INFORMR (in progress for **ISCA'24**) introducing an informed restart approach.

## TEACHING EXPERIENCE

**Teaching Assistant** at UBC Vancouver, BC, Canada
CPEN 312 - Digital Systems and Microcomputers *January 2024 - April 2024*
CPSC 322 - Introduction to Artificial Intelligence *July 2022 - August 2022*
APSC 160 - Introduction to Computation in Engineering Design *January 2022 - April 2022*
CPEN 411 - Computer Architecture *September 2021 - December 2021*
CPSC 340 - Machine Learning and Data Mining *January 2021 - April 2021*

## SKILLS

**Programming skills:**
Verilog, C, C++, CUDA, HIP, MPI, Java, Python, ARMv7 Assembly, Racket.
**Software Packages:**
Qiskit, Qulacs.
**Hardware:**
System-on-Chip (SoC) FPGA, Raspberry Pi, Arduino.