Yingheng Li

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Education

University of Pittsburgh — Pittsburgh, PA
Doctor of Philosophy in Computer Science — *Aug. 2022 – present*
GPA: 3.78/4.0

Colorado State University — Fort Collins, CO
Master of Science in Computer Engineering — *Aug. 2019 – May 2021*
GPA: 3.93/4.0

Colorado State University — Fort Collins, CO
Bachelor of Science in Electrical Engineering — *Aug. 2016 – May 2019*
GPA: 3.98/4.0 (Honors: *magna cum laude*)

Hunan University — Changsha, China
Bachelor of Science in Electronic and Information Engineering — *Sep. 2014 – July 2016*
GPA: 82.5/100

Research Experience

Compiler for Quantum Processor — Pittsburgh, PA
University of Pittsburgh — *Aug. 2022 – Present*
Advisor: Dr. Xulong Tang

- Design novel compiler frameworks to improve fidelity and scalability in executing quantum algorithms on both superconducting and photonic quantum processors. Four papers have been published [1, 2, 3, 4].

Low-temperature optimized circuit and architecture design — Los Angeles, CA
University of California Los Angeles — *Sep. 2021 – June. 2022*
Advisor: Dr. Puneet Gupta

- Develop a framework that can optimize VDD, Vth, and gate size for reduced power while maintaining frequency for a given ARM processor running at very low temperatures ($\sim$ 77 Kelvin).

Machine learning for multi-objective design space exploration — Fort Collins, CO
Colorado State University — *Oct. 2019 – May. 2021*
Advisor: Dr. Ryan G. Kim

- Implemented a hybrid multi-objective optimization algorithm that combined machine learning and genetic algorithms used to design 3-D NoC heterogeneous manycore systems. Wrote Python scripts to design NoC topologies and evaluated the designs with gem5-gpu. One conference paper has been published [5].

Uncertainty quantification of carbon nanotube interconnects — Fort Collins, CO
Colorado State University — *Sep. 2017 – May 2019*
Advisor: Dr. Sourajeet Roy (now in IIT Roorkee)

- Developed stochastic algorithms based on polynomial chaos to simulate uncertainty propagation in VLSI circuits designed with carbon nanotube interconnects. Published one journal paper [6] and two conference papers [7,8].

Publications

[1] **Yingheng Li**, Aditya Pawar, Zewei Mo, Youtao Zhang, Jun Yang, and Xulong Tang. "FMCC: Flexible Measurement-based Quantum Computation over Cluster State." In Proceedings of the 29th ACM International Conference on Architectural Support for Programming Languages and Operating Systems. (**ASPLOS 2024**, will be presented in ASPLOS 2025)

[2] Aditya Pawar, **Yingheng Li**, Yanan Guo, Xulong Tang, Youtao Zhang, and Jun Yang. "QRCC: Evaluating Large Quantum Circuits on Small Quantum Computers through Integrated Qubit Reuse and Circuit Cutting." In Proceedings of the 29th ACM International Conference on Architectural Support for Programming Languages and Operating Systems. (**ASPLOS 2024**, will be presented in ASPLOS 2025)

[3] Zewei Mo, **Yingheng Li**, Aditya Pawar, Xulong Tang, Jun Yang, and Youtao Zhang. "FCM: Wire Cutting For Fusion Reduction in Measurement-based Quantum Computing." In Proceedings of the 61th Design Automation Conference. (**DAC 2024**)

[4] **Yingheng Li**, Aditya Pawar, Mohadeseh Azari, Yanan Guo, Youtao Zhang, Jun Yang, Kaushik Parasuram Seshadreesan, and Xulong Tang. "Orchestrating Measurement-Based Quantum Computation over Photonic Quantum Processors." In Proceedings of the 60th Design Automation Conference. (**DAC 2023**)

[5] Sirui Qi, **Yingheng Li**, Sudeep Pasricha, and Ryan Kim. "MOELA: A Multi-Objective Evolutionary/Learning Design Space Exploration Framework for 3D Heterogeneous Manycore Platforms." In Proceedings of the 23rd Design, Automation & Test in Europe Conference & Exhibition. (**DATE 2023**)

[6] **Yingheng Li**, Sakshi Bhatnagar, Amanda Merkley, David Weber, and Sourajeet Roy. "A Predictor–Corrector Algorithm for Fast Polynomial Chaos-Based Uncertainty Quantification of Multi-Walled Carbon Nanotube Interconnects." IEEE Transactions on Components, Packaging and Manufacturing Technology, 9(10), pp.1963-1975, 2019. (**T-CPMT**)

[7] Sakshi Bhatnagar, **Yingheng Li**, Amanda Merkley, David Weber, and Sourajeet Roy, "Predictor-Corrector Algorithms and Their Scalability Analysis for Fast Stochastic Modeling of Multi-Walled Carbon Nanotube Interconnects." 2019 Joint International Symposium on Electromagnetic Compatibility, Sapporo and Asia-Pacific International Symposium on Electromagnetic Compatibility. (**EMC Sapporo/APEMC 2019**)

[8] Sakshi Bhatnagar, Amanda Merkley, Rena Berdine, **Yingheng Li**, and Sourajeet Roy, "Variability-aware performance assessment of multi-walled carbon nanotube interconnects using a predictor-corrector polynomial chaos scheme," in 2018 IEEE Electrical Design of Advanced Packaging and Systems Symposium. (**EDAPS 2018**)

Teaching Experience

ALGORITHMS & DATA STRUCTURES 1 (CS 0445) Pittsburgh, PA
University of Pittsburgh *Fall 2023*
- Taught basic concepts of algorithm and data structure using JAVA language.
- Grade students' homework and held three recitation sessions and office hours

Introduction to Electrical Engineering (EE 100) Los Angeles, CA
University of California Los Angeles *Spring 2022*
- Taught basics concepts of Electrical Engineering including AC/DC circuit, digital circuit, and Analog Circuit
- Held three recitation sessions and office hours per week

Introduction to Microprocessors (ECE 251) Fort Collins, CO
Colorado State University *Fall 2019, Fall 2020*
- Taught basics of ARM microprocessors, including C and assembly language in Keil uVision with Tiva's TM4C123G board
- Held three lab sessions and office hours per week

AC Circuit Analysis (ECE 202) Fort Collins, CO
Colorado State University *Spring 2020*
- Taught students how to analyze and build AC circuits on breadboards and in Cadence Virtuoso
- Held three lab sessions per week for over 60 students. Graded lab reports and exams

Electronics Principles (ECE 331, ECE 332) Fort Collins, CO
Colorado State University *Fall 2018, Spring 2019*
- Taught concepts of analog circuits and how to build analog circuits in Cadence Virtuoso
- Graded over 60 students' homework and exams

Linear Systems Analysis (ECE 311, ECE 312) Fort Collins, CO
Colorado State University *Fall 2018, Spring 2019*
- Explained concepts of signals and systems to students, including discrete and continuous frequency analysis and filters
- Graded over 75 students' homework and exams

Work Experience

Algorithms Engineer Guangzhou, China
GRG Banking *June 2019 – Aug. 2019*
- Developed an algorithm to quantify the density of people on buses used in public transportation
- Gathered and annotated pictures to create the dataset for training
- Combined and improved the existing convolutional neural network models. Trained the models with Python's Keras framework

Awards & Grants

- Pittsburgh Quantum Institute (PQI) Fellowship, Spring 2023, Spring 2024, Fall 2024
- Computer Science Department Fellowship, Fall 2022
- Global Partnership Award scholarship, Colorado State University, Aug. 2016 - May 2019
- Student Travel Grant Award, IEEE EDAPS, 2018

Technical Skills

Programming Languages: Python, C/C++, Java, Matlab, Verilog, Tcl, Assembly, LaTeX
Python Packages: Qiskit, Tensorflow, Keras, PyTorch, Scikit-learn, NumPy, Pandas, OpenCV