Yidong Zhou

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Education

Rutgers University — Piscataway, NJ
PhD Electrical and Computer Engineering (Transfer from RPI) — *Jan. 2026 -*

Rensselaer Polytechnic Institute — Troy, NY
PhD Computer Science — *Sep. 2024 - Dec. 2026*

Brown University — Providence, RI
Master of Science (Physics) — *Jan. 2021 - Dec. 2022*

Nankai University — Tianjin, China
Bachelor of Science (Applied Physics) — *Sept. 2016 - Jun. 2020*

Research Interest

My research spans two complementary domains at the intersection of quantum computing, physics, and computer science: quantum architecture co-design and quantum algorithms. In quantum co-design and architecture, I explore distributed quantum computing frameworks and optimized compilation strategies, focusing on error correction mechanisms to enhance computational fidelity while maximizing operational efficiency across hardware-software boundaries. Simultaneously, I develop and analyze quantum algorithms with real-world applications, integrating quantum computing to solve complex optimization problems. By leveraging interdisciplinary principles among quantum computing, computer science and theoretical physics, I advance quantum computing's practical capabilities while addressing fundamental challenges in computational complexity, aiming to achieve quantum advantage through novel algorithmic frameworks.

Honor, Award

Joint First Place, The LindaO'Bryant 2025 Prize
2025 DAC Young Fellow, 2025 The Design Automation Conference (DAC)
2025 IEEE QCE NSF Travel Grant, 2025 IEEE International Conference on Quantum Computing and Engineering
CPhO(Chinese Physics Olympiad) First Award, China
Poling Class Scholarship (Poling Class is an experimental class designed to cultivate top students in math, physics, and chemistry), Nankai University

Selected Publications

- **Quantum-machine-assisted Drug Discovery: Survey and Perspective.**
  Y. Zhou, J. Chen, J. Cheng, C. Xu, Y. Gao, G. Karemore, M. Zitnik, F.T. Chong, J. Liu, T. Fu, Z. Liang. *npj Drug Discovery* (2025)
- **EDDQC: Enhanced Dynamical Distributing Quantum Compilation.**
  Y. Zhou*, K. Liu*, H. Luo, L. Xiong, Y. Zhu, E. Casey, J. Cheng, S.Y.C. Chen, Z. Liang. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems* (2025)
- **Reinforcement Learning for Enhanced Advanced QEC Architecture Decoding.**
  Y. Zhou, L. Kong, Y. Peng, Z. Liang. *Asia and South Pacific Design Automation Conference (ASP-DAC)* (2026)
- **Hardware-aware Calibration Protocol for Quantum Computers.**
  Y. Zhu, J. Cheng, B. Li, K. Liu, **Y. Zhou**, H. Wang, Y. Ding, Z. Liang. *International Symposium on Computer Architecture (ISCA)* (2025)
- **EPOC: A Novel Pulse Generation Framework Incorporating Advanced Synthesis Techniques for Quantum Circuits.**
  J. Cheng, Y. Zhu, **Y. Zhou**, H. Ren, Z. Song, Z. Liang. *The Design Automation Conference (DAC)* (2025)
- **Coqa: Blazing Fast Compiler Optimizations for QAOA.**
  Y. Zhu*, **Y. Zhou***, J. Cheng, Y. Jin, B. Li, S. Niu, Z. Liang. *International Conference on Computer-Aided Design (ICCAD)* (2024)
- **A Comparison on Constrain Encoding Methods for Quantum Approximate Optimization Algorithm.**
  Y. Liu, Q. Jiao, **Y. Zhou**, Z. Liang, Y. Shi, K. Wan, S. Guo. *International Conference on Computer-Aided Design (ICCAD)* (2024)

Professional Experience

Quantum Algorithm Researcher — June 2024 – July 2024
SpinQ — *Shenzhen, China*

- Developed quantum-algorithm-based applications, including QKD protocols for clinical data security and distributed VQE methods for MAX-CUT.
- Researched and reproduced state-of-the-art quantum machine learning (QML) algorithms, adapting them to real-world use cases.

Quantum Computing Research Assistant October 2021 – May 2023

Brown Theoretical Physics Center, Brown University *Providence, RI*

- Benchmarked quantum and classical methods for prediction models, demonstrating a 30% overall gain in efficiency and accuracy through quantum-based approaches.
- Mapped correlations between model accuracy and hyperparameter choices using scatter plots, culminating in a 20% boost in predictive precision.

Machine Learning Engineer May 2021 – Sept 2021

Megvii Inc. *Beijing, China*

- Authored immersive AI curricula, projects, and the *Face*$^{++}$ platform to enhance developer proficiency enterprise-wide. Engineered and deployed face recognition systems using advanced deep learning models, achieving over 10,000 daily image processes at a 98.5% accuracy rate.
- Optimized Android apps through deep learning integrations (SDK/NDK), cutting unauthorized access by a substantial margin and reducing manual verifications by 70%.

Projects

Statistics of Classical Nonlinear Dynamical Systems | *Python, Julia* Sept. 2021 - Apr. 2023

- Investigated the use of NISQ (Noisy Intermediate-Scale Quantum) devices in solving the linear Fokker-Planck Equation (FPE) for classical nonlinear dynamical systems. Project participated in *APS March Meeting 2023*.
- Explored the Quantum Phase Estimation algorithm to obtain the stationary solution of the FPE, conducted tests on one-dimensional nonlinear Ornstein-Uhlenbeck systems, and implemented it on an 11-qubit quantum device. Scaled up the algorithm to 1000 times and improved the accuracy from 72% to 95%.
- Conducted tests on one-dimensional nonlinear Ornstein-Uhlenbeck systems to analyze the feasibility and challenges of solving the FPE using quantum computing.

Implementation of Deep Learning in New Particle Searching | *Python, MATLAB* Sept. 2022 – Jan. 2023

- Implemented a seven-layer MLP architecture with 267,260 trainable parameters using Tensorflow(Keras) to classify multiple scattering (MS) and single scattering (SS) events in Dark Matter Searching Experiments.
- Utilized simulated data to mimic real data statistics and generated a training set of 15,000 events and a testing set of 10,000 events with 400 bins each.
- Achieved exceptional accuracy in MS/SS classification, with a stable error rate of fewer than 90 parts per million.
- Successfully re-implemented and improved upon the method presented in reference. Demonstrated the effectiveness of MLPs in solving the previously unsolved problem of MS/SS classification in Dark Matter Searching Experiments.

Masked Face Recognition Terminal | *Python, Java, C++, Android NDK* May. 2021 – Sept. 2021

- Architectured a bifurcated system that processed over 10,000 images daily: the 'ClientSDK' handled the C-side, focusing on the loading, preprocessing, and post-processing of the mask detection model, the 'AndroidSDK' managed the Java side, ensuring real-time camera data capture and subsequent display of detection results on the terminal with a 98.5% accuracy.
- Integrated a state-of-the-art deep learning model trained on a backend dataset of over 200,000 images. This model, optimized for BGR-type inputs, demonstrated a throughput of 16 frames/second.
- Employed Android SDK and NDK for system integration into the RK3399 chip, resulting in a 30% improvement in processing speed and a 50% reduction in unauthorized or non-compliant access incidents.
- Conducted iterative testing and optimization, ensuring the system's compatibility with the large-scale commercial deployment, reducing manual checks by 70%.

Optical Properties of Spherical Single Crystal Lithium Niobate Cavity | Oct. 2019 - May. 2020

- Researched the structure and special properties of $LiNbO_3$ single crystals and six preparation methods. Discussed factors that optimize film properties and specifically introduce the pulsed laser deposition method.
- Wrote volume phase grating into square lithium niobate crystal, analysis photo-induction, and light scattering.
- Wrote optical grating into spherical lithium niobate cavity via two waves coupling, tested existence of optical grating, and estimated its diffraction rate.