Jinglei Cheng

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EDUCATION

- **University of Pittsburgh**, Pittsburgh, USA — Nov 2024 - Now
  Postdoctoral Associate
  Department of Computer Science
- **Purdue University**, West Lafayette, USA — Aug 2022 – Aug 2024
  Ph.D. of Computer Science
  Department of Computer Science
- **University of Southern California**, Los Angeles, USA — Aug 2018 – Aug 2022
  Master Electrical Engineering, Ph.D. Electrical Engineering (transferred to Purdue University)
  Ming Hsieh Department of Electrical and Computer Engineering
- **Tsinghua University**, Beijing, China — Sept 2014 – June 2018
  B. E. in Microelectronic Science and Engineering at Tsinghua University, China
  Department of Microelectronics and Nanoelectronics

RESEARCH INTERESTS

My research interests lie in the following areas:

- Interaction Between Quantum Computing and Physics: Exploring how fundamental principles of physics inform and enhance quantum computing methodologies and how quantum computing can produce new phenomenons.
- Quantum Neural Tangent Kernels (QNTK), Variational Quantum Algorithms (VQA), and Distributed Quantum Computing (DQC): Investigating the architectural aspects of these quantum computing paradigms to optimize performance and scalability.
- Hamiltonian Engineering in Analog Quantum Computing: Developing techniques to design and manipulate Hamiltonians for efficient analog quantum computations.

The overall goal is to bridge theoretical insights with practical implementations, pushing quantum computing toward tangible and possibly societal advancements.

Professional Activities

I serve as a Track Program Committee member for ICCAD 2024 and as a member of the Steering Committee of the Quantum Computer Systems (QuCS) Lecture Series. I also serve as reviewer in journals including QUANTUM and Transactions on Quantum Computing (TQC). I received ACM Graduate TA Award from Purdue University Department of Computer Science in 2024.

Personal

I'm an amateur astrophotographer with a passion for sports like hiking and badminton. As a teaching assistant, I find great fulfillment in sharing knowledge, answering questions, and educating others about science and technology.

PUBLICATIONS

[1] **Jinglei Cheng**, Haoqing Deng, and Xuehai Qian. Accqoc: Accelerating quantum optimal control based pulse generation. In *2020 ACM/IEEE 47th Annual International Symposium on Computer Architecture (ISCA)*, pages 543–555. IEEE, 2020.

[2] **Jinglei Cheng***, Zhiding Liang*, Hang Ren, Hanrui Wang, Fei Hua, Zhixin Song, Yongshan Ding, Frederic T Chong, Song Han, Xuehai Qian, et al. Napa: intermediate-level variational native-pulse ansatz for variational quantum algorithms. *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*, 2024.

[3] Youwei Zhuo, **Jinglei Cheng**, Qinyi Luo, Jidong Zhai, Yanzhi Wang, Zhongzhi Luan, and Xuehai Qian. Cse: Parallel finite state machines with convergence set enumeration. In *2018 51st Annual IEEE/ACM International Symposium on Microarchitecture (MICRO)*, pages 29–41. IEEE, 2018.

[4] **Jinglei Cheng***, Yuchen Zhu*, Yidong Zhou*, Yuwei Jin*, Boxi Li, Siyuan Niu, and Zhiding Liang. Coqa: Blazing fast compiler optimizations for qaoa. *ICCAD 2024*, 2024.

[5] **Jinglei Cheng***, Zhiding Liang*, Zhixin Song*, Hang Ren*, Tianyi Hao*, Rui Yang*, Yiyu Shi, and Tongyang Li. Spacepulse: Combining parameterized pulses and contextual subspace for more practical vqe. *DAC 2024*, 2024.

[6] Hanrui Wang, Pengyu Liu, **Jinglei Cheng**, Zhiding Liang, Jiaqi Gu, Zirui Li, Yongshan Ding, Weiwen Jiang, Yiyu Shi, Xuehai Qian, et al. Quest: Graph transformer for quantum circuit reliability estimation. *ICCAD 2022*, 2022.

[7] Zhiding Liang, Hanrui Wang, **Jinglei Cheng**, Yongshan Ding, Hang Ren, Zhengqi Gao, Zhirui Hu, Duane S Boning, Xuehai Qian, Song Han, et al. Variational quantum pulse learning. In *2022 IEEE International Conference on Quantum Computing and Engineering (QCE)*, pages 556–565. IEEE, 2022.

[8] Zhiding Liang, Zhixin Song, **Jinglei Cheng**, Zichang He, Ji Liu, Hanrui Wang, Ruiyang Qin, Yiru Wang, Song Han, Xuehai Qian, et al. Hybrid gate-pulse model for variational quantum algorithms. In *2023 Design Automation Conference (DAC)*, 2022.

[9] Zhiding Liang, Gang Liu, Zheyuan Liu, **Jinglei Cheng**, Tianyi Hao, Kecheng Liu, Hang Ren, Zhixin Song, Ji Liu, Fanny Ye, et al. Graph learning for parameter prediction of quantum approximate optimization algorithm. *DAC 2024*, 2024.

[10] **Jinglei Cheng**, Hanrui Wang, Zhiding Liang, Yiyu Shi, Song Han, and Xuehai Qian. Topgen: Topology-aware bottom-up generator for variational quantum circuits. *arXiv preprint arXiv:2210.08190*, 2022.

[11] **Jinglei Cheng**, Zhiding Liang, Rui Yang, Hang Ren, Yiyu Shi, Tongyang Li, and Xuehai Qian. Fidelity estimator, randomized benchmarking and zne for quantum pulses. *arXiv preprint arXiv:2305.12597*, 2023.

[12] **Jinglei Cheng**, Yuchen Zhu, Yidong Zhou, Hang Ren, Zhixin Song, and Zhiding Liang. Epoc: A novel pulse generation framework incorporating advanced synthesis techniques for quantum circuits. *arXiv preprint arXiv:2405.03804*, 2024.

[13] Ruiyang Qin, Zhiding Liang, **Jinglei Cheng**, Peter Kogge, and Yiyu Shi. Improving quantum classifier performance in nisq computers by voting strategy from ensemble learning. *arXiv preprint arXiv:2210.01656*, 2022.

[14] Zhiding Liang, **Jinglei Cheng**, Zhixin Song, Hang Ren, Rui Yang, Kecheng Liu, Peter Kogge, Tongyang Li, Yongshan Ding, and Yiyu Shi. Towards advantages of parameterized quantum pulses. *arXiv preprint arXiv:2304.09253*, 2023.

[15] Keyu Ning, Houfang Liu, Zhenyi Ju, Chi Fang, Caihua Wan, **Jinglei Cheng**, Xiao Liu, Linsen Li, Jiafeng Feng, Hongxiang Wei, et al. Magneto-seebeck effect in magnetic tunnel junctions with perpendicular anisotropy. *Aip Advances*, 7(1), 2017.

[16] Zhiding Liang, **Jinglei Cheng**, Rui Yang, Hang Ren, Zhixin Song, Di Wu, Xuehai Qian, Tongyang Li, and Yiyu Shi. Unleashing the potential of llms for quantum computing: A study in quantum architecture design. *arXiv preprint arXiv:2307.08191*, 2023.

[17] Hanrui Wang, Yilian Liu, Pengyu Liu, Jiaqi Gu, Zirui Li, Zhiding Liang, **Jinglei Cheng**, Yongshan Ding, Xuehai Qian, Yiyu Shi, et al. Robuststate: Boosting fidelity of quantum state preparation via noise-aware variational training. *arXiv preprint arXiv:2311.16035*, 2023.

[18] Yidong Zhou, Jintai Chen, Weikang Li, **Jinglei Cheng**, Gopal Karemore, Marinka Zitnik, Frederic Chong, Junyu Liu, Tianfan Fu, and Zhiding Liang. Quantum-machine-assisted drug discovery: Survey and perspective. *arXiv preprint arXiv:2408.13479*, 2024.