Che-Kai Liu

Curriculum Vitae *last update: 6/07/2023*

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Education

2023–present **PhD, Electrical & Computer Engineering**, *Georgia Institute of Technology*, Atlanta, GA, USA.
Research Focus: Computer Architecture and Circuit Tape-Out for Next-Generation AI Algorithms.
Advisor: Steve W. Chaddick school chair and Prof., Arijit Raychowdhury

2019–2023 **Bachelor of Engineering, Electrical & Computer Engineering**, *Zhejiang University*, China.

Publications

*: Equal Contributions. Underline: Advisors for the paper. †: Correspondence.

In Conference Proceedings

MLSys 2023 Zishen Wan, **Che-Kai Liu***, Hanchen Yang*, Chaojian Li*, Haoran You*, Yonggan Fu, Cheng Wan, Tushar Krishna†, Yingyan (Celine) Lin†, and Arijit Raychowdhury†. *** equal contributions**. Towards cognitive ai system: A survey and prospective on neuro-symbolic ai. In *Workshop on Systems for Next-Gen AI Paradigms, Sixth Conference on Machine Learning and Systems*, MLSys 2023.

DATE 2023 Hamza E. Barkam, Sanggeon Yun, Paul R. Genssler, Zhuowen Zou, **Che-Kai Liu**, Hussam Amrouch, and Mohsen Imani†. Hdgim: Hyperdimensional genome sequence matching on unreliable highly-scaled fefet. In *Proceedings of the IEEE/ACM Design Automation and Test in Europe. Acceptance rate: 25%*. IEEE/ACM, DATE 2023.

ACM SRC 2023 **Che-Kai Liu**†, Mengyuan Li, Mohsen Imani, X. Sharon Hu, and Xunzhao Yin. Compute-in-memory: From device to application. In *ACM Student Research Competition Final*. ACM, ACM SRC 2023.

ICCAD 2022 **Che-Kai Liu**, Haobang Chen, Mohsen Imani, Kai Ni, Arman Kazemi, Ann Franchesca Laguna, Michael Niemier, Xiaobo Sharon Hu, Liang Zhao, Cheng Zhuo, and Xunzhao Yin†. Cosime: Fefet based associative memory for in-memory cosine similarity search. In *Proceedings of the 41st IEEE/ACM International Conference on Computer-Aided Design. Acceptance rate: 22%*. IEEE/ACM, ICCAD 2022.

Professional Experience

Georgia Institute of Technology, USA

Jan, 2023 – present **Neuro-Symbolic Computer Architecture and Circuit**.

University of California Irvine, USA

Aug. 2022 – Jan. 2023 **Vector Symbolic Algorithm, Circuit and Architecture**.

University of Notre Dame, USA

June. 2022 – Jan. 2023 **Reconfigurable Content Addressable Memory Based on Multi-Variate Non-Linear Optimization**.

Zhejiang University, P.R.C

Dec. 2020 – May. 2022 **In-memory Computing Analog Circuits**.

Fellowships & Awards

2023 ACM Student Research Competition **Finalist (Ranked 4^{th} worldwide)**.

2023 Outstanding undergraduate thesis award. Thesis title: "Cross-Layer Optimization for Computing-in-Memory Circuits, Architectures and Applications". Issued: Zhejiang University, P.R.C

2022 **First Place**, ACM Student Research Competition at ACM/IEEE Int'l Conference on Computer-Aided Design (ICCAD), 2022. Will represent ACM SIGDA at the ACM banquet 2023.

2022 **Best** presentation award at ACM/IEEE ESWEEK EIC workshop, 2022.

2022 Research sponsorship from Fellow of IEEE/ACM Prof. X. Sharon Hu, 2022

2022 Research scholarship from the University of Notre Dame, IN, USA 2022

2022 Third-Class Scholarship for Award of Merits, 2022. Issued: Zhejiang University

2022 Scholarship for Hongkong, Macau, Taiwan and Overseas Chinese. Issued: Ministry of Education, P.R.C.

2022 Third-Prize of P.R.C National Talents Training Base, 2022. Issued: Zhejiang University

2022 Outstanding student of innovation and entrepreneurship 2022, academic excellence 2022, international engagement 2022. Issued: Zhejiang University.

2021 Scholarship for Hongkong, Macau, Taiwan and Overseas Chinese. Issued: Ministry of Education, P.R.C.

2020 Scholarship for Hongkong, Macau, Taiwan and Overseas Chinese. Issued: Ministry of Education, P.R.C.

Talks

2023 "When Vector Symbolic Architecture meets Compute-in-Memory", ICSR Lab, Georgia Institute of Technology, Virtual

2022 Student Research Competition, IEEE/ACM 41^{st} International Conference on Computer-Aided Design (ICCAD), San Diego, CA, USA.

2022 Regular Paper Author, IEEE/ACM 41^{st} International Conference on Computer-Aided Design (ICCAD), 2023, San Diego, CA, USA.

2022 "Compute-in-Memory: A Cross-Layer Perspective", Bias Lab, University of California, Irvine, CA, USA.

2022 "An efficient Associative Memory Engine for Cosine Similarity-Based Nearest Neighbor Search", ACM/IEEE Embedded System Week (ESWEEK), Edge Intelligent Computing workshop, virtual.

Skills

Technical Skill: SPICE (Cadence Virtuoso), Python (Pytorch), Synopsys Compiler (Synthesis), C, (System) Verilog, MATLAB, Assembly (RISC-V)

Knowledge: Compute-in-Memory, Analog & Digital Circuit, Neuro-Symbolic Algorithms

Reviewer for

2022–present **IEEE JETCAS**.

Research Agencies Participated

2023–2028 **Cocosys: center for the Co-Design of Cognitive Systems**, *Funded by: DARPA & SRC.*

Referees

Dr. Arijit Raychowdhury
Fellow of IEEE

Steve W. Chaddick School Chair and Professor, School of Electrical & Computer Engineering
Georgia Institute of Technology, Atlanta, GA, USA
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Dr. Xiaobo Sharon Hu
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Professor, Department of Computer Science & Engineering
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Dr. Xunzhao Yin
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