# Che-Kai Liu

*Curriculum Vitae* *last update: 7/24/2023*

*Klaus 2305, 266 Ferst Drive, Atlanta, GA 30332, USA*
*School of ECE, Georgia Institute of Technology*
*+1 (404) 706-4576*
*che-kai@gatech.edu*
*Linkedin* *My webpage*

## Education

2023–present **PhD, Electrical & Computer Engineering**, *Georgia Institute of Technology*, Atlanta, GA, USA.
Research Focus: Computer Architecture and VLSI.
Advisor: Steve W. Chaddick school chair and Prof., Arijit Raychowdhury

2019–2023 **Bachelor of Engineering, Electronics Science and Technology**, *Zhejiang University*, Hangzhou, Zhejiang, PRC.

## 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.

ICCAD 2023 Shengxi Shou, **Che-Kai Liu**, Sanggeon Yun, Zishen Wan, Kai Ni, Mohsen Imani, X. Sharon Hu, Jianyi Yang, Cheng Zhuo, and Xunzhao Yin†. See-mcam: A scalable multi-bit fefet content addressable memory for energy efficient associative search. In *Proceedings of the IEEE/ACM International Conference on Computer-Aided Design. Acceptance rate: 22.9%*. IEEE/ACM, ICCAD 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, PRC

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, PRC

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, PRC

2022 Third-Prize of PRC 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, PRC

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

## 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 Cosime: Fefet based associative memory for in-memory cosine similarity search, 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
✉ arijit.raychowdhury@ece.gatech.edu

**Dr. Xiaobo Sharon Hu**
*Fellow of IEEE & ACM*
*Professor, Department of Computer Science & Engineering*
University of Notre Dame, IN, USA
✉ shu@nd.edu

**Dr. Mohsen Imani**
*Assistant Professor, Department of Information & Computer Science*
University of California, Irvine, CA, USA
✉ m.imani@uci.edu

**Dr. Xunzhao Yin**
*Assistant Professor, Department of Information Science & Electronic Engineering*
Zhejiang University, Hangzhou, Zhejiang, PRC
✉ xzyin1@zju.edu.cn