CHEN BAI

Ph.D. ⋄ Department of Computer Science & Engineering ⋄ The Chinese University of Hong Kong
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https://baichen318.github.io/

RESEARCH INTERESTS

- Computer Architecture & Computer Systems
- Electronic Design Automation (EDA)

EDUCATION

The Chinese University of Hong Kong, NT, Hong Kong Aug. 2020 – Jul. 2024
Ph.D., Computer Science & Engineering
Supervisor: Prof. Bei Yu & Prof. Martin D.F. Wong

UESTC, Chengdu, P.R. China Sep. 2016 – Jul. 2020
B.Eng., Software Engineering

PUBLICATIONS

† denotes equal contribution.

Conference Papers

[C18] Peng Xu, Su Zheng, Yuyang Ye, **Chen Bai**, Siyuan Xu, Hao Geng, Tsung-Yi Ho, Bei Yu, "RankTuner: When Design Tool Parameter Tuning Meets Preference Bayesian Optimization", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), New Jersey, Oct. 27–31, 2024.

[C17] Yuanhang Gao, Donger Luo, **Chen Bai**, Bei Yu, Hao Geng, Qi Sun, Cheng Zhuo, "Is Vanilla Bayesian Optimization Enough for High-Dimensional Architecture Design Optimization?", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), New Jersey, Oct. 27–31, 2024.

[C16] Lancheng Zou, Wenqian Zhao, Shuo Yin, **Chen Bai**, Qi Sun, Bei Yu, "BiE: Bi-Exponent Block Floating-Point for Large Language Models Quantization", International Conference on Machine Learning (**ICML**), Vienna, Jul. 21–27, 2024.

[C15] Donger Luo, Qi Sun, Xinheng Li, **Chen Bai**, Bei Yu, Hao Geng, "Knowing The Spec to Explore The Design via Transformed Bayesian Optimization", ACM/IEEE Design Automation Conference (**DAC**), San Francisco, Jun. 23–27, 2024.
(paper)

[C14] Tong Qiao, Jianlei Yang, Yingjie Qi, Ao Zhou, **Chen Bai**, Bei Yu, Weisheng Zhao, Chunming Hu, "GNN-Navigator: Towards Adaptive Training of Graph Neural Networks via Automatic Guideline Exploration", ACM/IEEE Design Automation Conference (**DAC**), San Francisco, Jun. 23–27, 2024.
(paper)

[C13] **Chen Bai**, Jianwang Zhai, Yuzhe Ma, Bei Yu, Martin D.F. Wong, "Towards Automated RISC-V Microarchitecture Design with Reinforcement Learning", AAAI Conference on Artificial Intelligence (**AAAI**), Vancouver, Feb. 20–27, 2024.
(paper) (slides) (code) (poster) (video)

[C12] Yuan Pu, Tinghuan Chen, Zhuolun He, **Chen Bai**, Haisheng Zheng, Yibo Lin, Bei Yu, "IncreMacro: Incremental Macro Placement Refinement", ACM International Symposium on Physical Design (**ISPD**), Taipei, Mar. 12–15, 2024.
(Best Paper Candidate)
(paper) (slides)

[C11] Shixin Chen, Su Zheng, **Chen Bai**, Wenqian Zhao, Shuo Yin, Yang Bai, Bei Yu, "SoC-Tuner: An Importance-guided Exploration Framework for DNN-targeting SoC Design", IEEE/ACM Asian and South Pacific Design Automation Conference (**ASPDAC**), South Korea, Jan. 22 – 25, 2024.
(paper) (slides)

[C10] **Chen Bai**, Xuechao Wei, Youwei Zhuo, Yi Cai, Hongzhong Zheng, Bei Yu, Yuan Xie, "Klotski: DNN Model Orchestration Framework for Dataflow Architecture Accelerators", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), San Francisco, Oct. 29 – Nov. 02, 2023.
(paper) (slides) (poster) (video)

[C9] Ziyang Yu, **Chen Bai**, Shoubo Hu, Ran Chen, Taohai He, Mingxuan Yuan, Bei Yu, Martin Wong, "IT-DSE: Invariant Risk Minimized Transfer Microarchitecture Design Space Exploration", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), San Francisco, Oct. 29 – Nov. 02, 2023.
(paper) (slides)

[C8] **Chen Bai**, Jiayi Huang, Xuechao Wei, Yuzhe Ma, Sicheng Li, Hongzhong Zheng, Bei Yu, Yuan Xie, "ArchExplorer: Microarchitecture Exploration Via Bottleneck Analysis", IEEE/ACM International Symposium on Microarchitecture (**MICRO**), Toronto, Oct. 28 – Nov. 01, 2023.
(paper) (slides) (code) (poster)

[C7] **Chen Bai** †, Sicheng Li †, Xuechao Wei, Bizhao Shi, Yen-Kuang Chen, Yuan Xie, "2022 ICCAD CAD Contest Problem C: Microarchitecture Design Space Exploration", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), San Diego, Oct. 30 – Nov. 3, 2022. (**Invited Paper**)
(paper) (slides) (code)

[C6] Ziyi Wang, **Chen Bai**, Zhuolun He, Guangliang Zhang, Qiang Xu, Tsung-Yi Ho, Bei Yu, Yu Huang, "Functionality Matters in Netlist Representation Learning", ACM/IEEE Design Automation Conference (**DAC**), San Francisco, CA, Jul. 10 – 14, 2022.
(paper) (slides)

[C5] Qi Sun, **Chen Bai**, Tinghuan Chen, Hao Geng, Xinyun Zhang, Yang Bai, Bei Yu, "Fast and Efficient DNN Deployment via Deep Gaussian Transfer Learning", IEEE International Conference on Computer Vision (**ICCV**), Oct. 11 – 17, 2021.
(paper) (slides) (poster)

[C4] Zhuolun He, Ziyi Wang, **Chen Bai**, Haoyu Yang, Bei Yu, "Graph Learning-Based Arithmetic Block Identification", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Nov. 1 – 4, 2021.
(paper) (slides)

[C3] **Chen Bai**, Qi Sun, Jianwang Zhai, Yuzhe Ma, Bei Yu, Martin D.F. Wong, "BOOM-Explorer: RISC-V BOOM Microarchitecture Design Space Exploration Framework", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Nov. 1 – 4, 2021.
(William J. McCalla Best Paper Award)
(paper) (slides) (code) (video) (CUHK-CSE news) (ICCAD link)

[C2] Jianwang Zhai, **Chen Bai**, Binwu Zhu, Yici Cai, Qiang Zhou, Bei Yu, "McPAT-Calib: A Microarchitecture Power Modeling Framework for Modern CPUs", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Nov. 1 – 4, 2021.
(paper) (slides)

[C1] Qi Sun, **Chen Bai**, Hao Geng, Bei Yu, "Deep Neural Network Hardware Deployment Optimization via Advanced Active Learning", IEEE/ACM Proceedings Design, Automation and Test in Europe (**DATE**), Feb. 1 – 5, 2021.
(paper) (slides)

Journal papers

[J6] **Chen Bai**, Xuechao Wei, Youwei Zhuo, Yi Cai, Hongzhong Zheng, Bei Yu, Yuan Xie, "Klotski v2: Improved DNN Model Orchestration Framework for Dataflow Architecture Accelerators", accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**).

[J5] Ziyi Wang, **Chen Bai**, Zhuolun He, Guangliang Zhang, Qiang Xu, Tsung-Yi Ho, Yu Huang, Bei Yu, "FGNN2: A Powerful Pre-training Framework for Learning the Logic Functionality of Circuits", accepted

by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**).
(paper) (code)

[J4] **Chen Bai**, Qi Sun, Jianwang Zhai, Yuzhe Ma, Bei Yu, Martin D.F. Wong, "BOOM-Explorer: RISC-V BOOM Microarchitecture Design Space Exploration", ACM Transactions on Design Automation of Electronic Systems (**TODAES**), vol. 29, no. 01, pp. 1–23, 2024.
(paper)

[J3] Su Zheng, Hao Geng, **Chen Bai**, Bei Yu, Martin Wong, "Boosting VLSI Design Flow Parameter Tuning with Random Embedding and Multi-objective Trust-region Bayesian Optimization", ACM Transactions on Design Automation of Electronic Systems (**TODAES**), vol. 28, no. 05, pp. 1 – 23, 2023.
(paper)

[J2] Ziyi Wang, Zhuolun He, **Chen Bai**, Haoyu Yang, Bei Yu, "Efficient Arithmetic Block Identification with Graph Learning and Network-flow", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), vol. 42, no. 08, pp. 2591 – 2603, 2023.
(paper)

[J1] Jianwang Zhai, **Chen Bai**, Binwu Zhu, Yici Cai, Qiang Zhou, Bei Yu, "McPAT-Calib: A RISC-V BOOM Microarchitecture Power Modeling Framework", IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), vol. 42, no. 01, pp. 243 – 256, 2023.
(paper)

EXPERIENCE

Alibaba DAMO Academy, Beijing, P.R. China Jun. 2022 – May. 2024
Research Intern, Computing Technology Lab
Topic: Chip agile design methodology & Dataflow computing substrate
Description: My job focuses on the research for chip agile design methodology and some topics about dataflow computing substrate.

Huawei Hong Kong Research Center, Hong Kong SAR Jun. 2021 – Apr. 2022
Research Intern, Turing Core & Key Technologies Development Department, HiSilicon HK
Topic: Microprocessor microarchitecture design space exploration & Power modeling
Description: My job focuses on research for the microarchitecture design space exploration and power modeling of the next-generation in-house microprocessor.

SenseTime, Beijing, P.R. China Sep. 2019 – Jul. 2020
Research Intern, Intelligent Video Generation Group
Topic: SenseAR DigitalHuman – Audio-Driven Virtual Human (Product)(China Daily)
Description: I work as a research intern, focusing on 2D and 3D digital human research and prototypes. The research and prototypes led to the commercial product SenseAR DigitalHuman, an audio-driven virtual human. The product has contributed over ten million RMB in profits to the SenseTime until the end of 2020.
(link) (China Daily)

Intel Asia-Pacific R. & D. Center, Shanghai, P.R. China Feb. 2019 – Jul. 2019
Engineering Intern, Web Runtime Optimization Group
Topic: Chrome browser optimization for Intel architecture-based Chromebooks
Description: Conduct engineering implementation to accelerate Chrome brower applications for Intel architecture-based Chromebooks. Implemented codes are committed to the Chromium community. (code)

University of Maryland, Washington, D.C., U.S.A. Jul. 2018 – Aug. 2018
Visiting Student
Topic: Study of "Leadership, Innovation, and Decision Making"

SELECTED AWARDS AND HONORS

ISPD Best Paper Candidate	IEEE CEDA & ACM SIGDA	2024
ICCAD Travel Support Grant	Futurewei, CEDA, and SIGDA	2023
MICRO 2023 Student Travel Grants	TCuARCH, ACM SIGMICRO	2023
William J. McCalla Best Paper Award	IEEE CEDA & ACM SIGDA	2021
Full Postgraduate Scholarship	The Chinese University of Hong Kong	2020 – 2024
Outstanding Graduate	The Education Department of Sichuan Province	2020

Excellent Thesis Award	UESTC	2020
National Scholarship	Ministry of Education	2017 – 2018
National Scholarship	Ministry of Education	2016 – 2017
Meritorious Winner of ICM	COMAP, INFORMS, SIAM, MAA, ASA, AMS	2018

TEACHING ASSISTANT

2023 Spring	CENG3420 Computer Organization and Design
2022 Spring	CENG3420 Computer Organization and Design
2021 Spring	CENG3420 Computer Organization and Design
2020 Fall	ENGG1110E Problem Solving By Programming

PROFESSIONAL SERVICE

Invited Talks

- 2023 Peisu XIA Forum, Institute of Computing Technology, Chinese Academy of Sciences (link)
- 2022 ACM SIGDA/IEEE CEDA Design Automation WebiNar (DAWN) (link) (video)

Journal Reviewer

- IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
- ACM Transactions on Design Automation of Electronic Systems (TODAES)
- IEEE Transactions On Very Large Scale Integration (VLSI) Systems (TVLSI)
- Integration, the VLSI Journal
- IEEE Design & Test

Conference Reviewer

- ACM/IEEE Design Automation Conference (DAC), 2022, 2023, 2024
- ACM/IEEE International Conference on Computer-Aided Design (ICCAD), 2022, 2023, 2024
- ACM/IEEE Asia and South Pacific Design Automation Conference (ASPDAC), 2022, 2023
- ACM/IEEE Workshop on Machine Learning for CAD (MLCAD), 2022

GRADUATE LEVEL COURSES

ENGG 5781	Matrix Analysis and Computations
ENGG 5301	Information Theory
CSCI 5160	Advanced Algorithms
CENG 5030	Energy Efficient Computing
SEEM 4340	Numerical Optimization
CSCI 5650	Graph Neural Networks
CSCI 5350	Advanced Topics in Game Theory
CENG 5270	EDA for Physical Design and Digital Systems

BASIC TECHNICAL SKILLS

Programming Languages	C/C++, Python, Java
Toolkits	Linux, MacOS, LaTeX

REFERENCES

Google Scholar

GitHub

LinkedIn