

Guojin Chen

✉ cgjcuhk@gmail.com • 🌐 gjchen.me • in dekura • 📷 dekura

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Current Position

Research Intern, NVIDIA, Austin, Texas 2024.04 – Present
Ph.D. Candidate, The Chinese University of Hong Kong 2021.08 – Present

Supervisor : Prof. Bei Yu

Education

Ph.D. in Computer Science, The Chinese University of Hong Kong 2021 – Present
M.S. in Computer Science, The Chinese University of Hong Kong 2019 – 2020
B.S. in Computer Science, Huazhong University of Science and Technology 2015 – 2019

Research Interests

- Scaling deep learning: large language models, LLM on EDA, large-scale layout representation learning.
- Design for manufacturing: computational lithography, mask optimization, OPC, SMO.
- Deep learning in VLSI design: physics-informed networks for EDA problems
- Optimization: bi-level & multi-level optimization, GPU acceleration, level-set optimization.

Experiences

Research Scientist Intern, NVIDIA, Austin, TX (Mentor & Manager. Haoyu Yang & Mark Ren) 2024.04 – Present
Visiting Scholar, The University of Texas at Austin, Austin, TX (Supervisor : Prof. David Z. Pan) 2023.08 – 2024.4
Research Intern, Tencent, Shenzhen, China 2018 – 2019

Publications [Google Scholar; 159+ citations, h-index: 7+]

Representative publications that I am a primary author on are highlighted.

Conference papers.....

- [C15] Efficient Bilevel Source Mask Optimization
Guojin Chen, Hongquan He, Peng Xu, Hao Geng, and Bei Yu
(DAC 2024) *ACM/IEEE Design Automation Conference*
- [C14] Fracturing-aware Curvilinear ILT via Circular E-beam Mask Writer
Xinyun Zhang, Su Zheng, **Guojin Chen**, Binwu Zhu, Hong Xu, and Bei Yu
(DAC 2024) *ACM/IEEE Design Automation Conference*
- [C13] Performance-driven Analog Routing via Heterogeneous 3DGNN and Potential Relaxation
Peng Xu, **Guojin Chen**, Keren Zhu, Tinghuan Chen, Tsung-Yi Ho, and Bei Yu
(DAC 2024) *ACM/IEEE Design Automation Conference*
- [C12] Open-Source Differentiable Lithography Imaging Framework
Guojin Chen, Hao Geng, Bei Yu, and David Z. Pan
(SPIE 2024) *SPIE Advanced Lithography + Patterning*
- [C11] AlphaSyn: Logic Synthesis Optimization with Efficient Monte Carlo Tree Search
Zehua Pei, Fangzhou Liu, Zhuolun He, **Guojin Chen**, Haisheng Zheng, Keren Zhu, and Bei Yu
(ICCAD 2023) *Proceedings of the 42th International Conference on Computer-Aided Design*
- [C10] Physics-Informed Optical Kernel Regression Using Complex-valued Neural Fields
Guojin Chen, Zehua Pei, Haoyu Yang, Yuzhe Ma, Bei Yu, and Martin Wong
(DAC 2023) *ACM/IEEE Design Automation Conference* (Best score in DFM track.)

- [C9] DiffPattern: Layout Pattern Generation via Discrete Diffusion
Zixiao Wang, Yunheng Shen, Wenqian Zhao, Yang Bai, **Guojin Chen**, Farzan Farnia, and Bei Yu
(**DAC 2023**) *ACM/IEEE Design Automation Conference*
- [C8] GPU-accelerated Matrix Cover Algorithm for Multiple Patterning Layout Decomposition
Guojin Chen, Haoyu Yang, and Bei Yu
(**SPIE 2023**) *DTCO and Computational Patterning II*
- [C7] Efficient Point Cloud Analysis Using Hilbert Curve.
Wanli Chen, Xinge Zhu, **Guojin Chen**, and Bei Yu
(**ECCV 2022**) *European Conference on Computer Vision*
- [C6] AdaOPC: A Self-Adaptive Mask Optimization Framework For Real Design Patterns
Wenqian Zhao, Xufeng Yao, Ziyang Yu, **Guojin Chen**, Yuzhe Ma, Bei Yu, and Martin Wong
(**ICCAD 2022**) *Proceedings of the 41th International Conference on Computer-Aided Design*
- [C5] LayoutTransformer: Generating Layout Patterns with Transformer via Sequential Pattern Modeling
Liangjian Wen, Yi Zhu, Lei Ye, **Guojin Chen**, Bei Yu, Jianzhuang Liu, and Chunjing Xu
(**ICCAD 2022**) *Proceedings of the 41th International Conference on Computer-Aided Design*
- [C4] DevelSet: Deep Neural Level Set for Instant Mask optimization
Guojin Chen, Ziyang Yu, Hongduo Liu, Yuzhe Ma, and Bei Yu
(**ICCAD 2021**) *Proceedings of the 40th International Conference on Computer-Aided Design*
- [C3] Learning Point Clouds in EDA.
Wei Li, **Guojin Chen**, Haoyu Yang, Ran Chen, and Bei Yu
(**ISPD 2021**) *ACM International Symposium on Physical Design*
- [C2] DAMO: Deep Agile Mask Optimization for Full Chip Scale
Guojin Chen, Wanli Chen, Yuzhe Ma, Haoyu Yang, and Bei Yu
(**ICCAD 2020**) *Proceedings of the 39th International Conference on Computer-Aided Design*
- [C1] A GPU-enabled Level Set Method for Mask Optimization
Ziyang Yu, **Guojin Chen**, Yuzhe Ma, and Bei Yu
(**DATE 2020**) *IEEE/ACM Proceedings Design, Automation and Test in Europe*

Journal papers.....

- [J6] DeepOTF: Learning Equations-constrained Prediction for Electromagnetic Behavior
Peng Xu, Siyuan Xu, Tinghuan Chen, **Guojin Chen**, Tsung-Yi Ho, and Bei Yu
(**TODAES 2024**) *ACM Trans. Des. Autom. Electron. Syst.*
- [J5] Ultra-Fast Source Mask Optimization via Conditional Discrete Diffusion
Guojin Chen, Zixiao Wang, Bei Yu, David Z. Pan, and Martin D.F. Wong
(**TCAD 2024**) *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*
- [J4] L2O-ILT: Learning to Optimize Inverse Lithography Techniques
Binwu Zhu, Su Zheng, Ziyang Yu, **Guojin Chen**, Yuzhe Ma, Fan Yang, Bei Yu, and Martin Wong
(**TCAD 2023**) *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*
- [J3] A GPU-Enabled Level-Set Method for Mask Optimization
Ziyang Yu, **Guojin Chen**, Yuzhe Ma, and Bei Yu
(**TCAD 2023**) *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*
- [J2] DevelSet: Deep Neural Level Set for Instant Mask optimization
Guojin Chen, Ziyang Yu, Hongduo Liu, Yuzhe Ma, and Bei Yu
(**TCAD 2023**) *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*
- [J1] DAMO: Deep Agile Mask Optimization for Full-Chip Scale
Guojin Chen, Wanli Chen, Qi Sun, Yuzhe Ma, Haoyu Yang, and Bei Yu
(**TCAD 2022**) *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems*

Preprints.....

[P1] LLM-Enhanced Bayesian Optimization for Efficient Analog Layout Constraint Generation
Guojin Chen, Keren Zhu, Seunggeun Kim, Hanqing Zhu, Yao Lai, Bei Yu, and David Z Pan
(arXiv 2024) *arXiv preprint arXiv:2406.05250*

Open Source Repositories

1. TorchOPC/TorchLitho — ★84 — <i>Differentiable computational lithography with PyTorch</i>	2024
2. OpenOPC/OpenILT — ★92 — <i>Open-source inverse lithography technology (ILT) framework</i>	2023
3. ai4eda/awesome-AI4EDA — ★97 — <i>A curated paper list of existing AI for EDA studies.</i>	2023

Awards

Ph.D. Studentship	2021 – 2025
By Chinese University of Hong Kong, 2021-2025	
Outstanding Graduate	2019
By Huazhong University of Science and Technology	

Ongoing Projects

Differentiable Computational Lithography. Revamping lithography with a GPU-accelerated, differentiable workflow based on Abbe imaging, using automatic differentiation to target diverse resolution enhancement objectives.

Professional Activities

Paper Review / External Review.....

Design Automation Conference (DAC)	2021-2023
AAAI Conference on Artificial Intelligence (AAAI)	2022-2023
IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)	2022-2023