Guojin Chen

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Current Position

Visiting Student, *The University of Texas at Austin* 2023.08 – Present
Supervisor : Prof. David Z. Pan

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 representaion 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) 2024.05 – Present
Visiting Ph.D. Student, *The University of Texas at Austin*, Austin, TX (Supervisor : Prof. David Z. Pan) 2023.08 – 2024.5
Research Intern, *Tencent*, Shenzhen, China 2018 – 2019

Publications [Google Scholar; 151+ citations, h-index: 6+]

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] LayouTransformer: 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*

Open Source Repositories

1. TorchOPC/TorchLitho — ★54 — *Differentiable computational lithography with PyTorch* 2024

2. OpenOPC/OpenILT — ★84 — *Open-source inverse lithography technology (ILT) framework* 2023
3. ai4eda/awesome-AI4EDA — ★95 — *A curated paper list of existing AI for EDA studies.* 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