JINGSONG CHEN

Ph.D. Student
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RESEARCH INTERESTS

- Physical design of VLSI circuits
- Machine learning-related topics in physical design

EDUCATION

The Chinese University of Hong Kong, NT, Hong Kong July 2017 – Present
Ph.D. student, Department of Computer Science & Engineering.
Advisor: Prof. Evangeline F.Y. Young

Zhejiang University, Hangzhou, P.R. China Sep. 2013 – July 2017
B.Eng., Computer Science and Technology. (GPA 88.13/100)
Dissertation: "Research on StarCraft AI Based on Deep Reinforcement Learning"

RESEARCH AND PROJECT EXPERIENCE

- Detection of Largest Repeating Layout Pattern
  - Detect all the largest repeating patterns from a large flat layout in a reasonable runtime and memory.
- Initial Detailed Routing
  - Initial detailed routing with realistic design rules faced by physical design practitioners in the industry.
- Obstacle-Aware On-Track Bus Routing
  - Route buses among small obstacles while maintaining the same routing topology for all bus bits.
- Routing Enhancement with Deep Learning (done during internship in Cadence)
  - Enhance global routing with predicted routing congestion using fully convolutional network.
- Wafer-Scale Deep Learning Accelerator Placement
  - Place DNNs on wafer-scale AI accelerator with optimal kernel sizing.
- Routing with Cell Movement
  - Develop a global routing engine which can also do cell movement to improve the routing solution.

EXPERIENCE

Cadence Design Systems, Inc., San Jose, CA, USA May 2019 – Oct. 2019
Research Intern in Global Routing Team
Topic: Global Routing Enhancement with Deep Learning

Synopsys, Inc., Shanghai, China June 2018 – Aug. 2018
Research Intern in SEG Proteus Geometry Engine Team
Topic: Layout Pattern Detection

The Chinese University of Hong Kong, Hong Kong, China Sep. 2017 – Aug. 2020
Teaching Assistant in CSE Department

The Hong Kong Polytechnic University, NT, Hong Kong Sep. 2016 – Mar. 2017
Exchange Student in Department of Computing

SELECTED AWARDS AND HONORS

First Place Award at ICCAD Contest on "Routing with Cell Movement"	2020
DAC Young Fellow Award	2020
First Place Award at ISPD Contest on "Wafer-Scale Deep Learning Accelerator Placement" (Co-Leader)	2020
First Place Award at ISPD Contest on "Initial Detailed Routing"	2019
First Place Award at ICCAD Contest on "Obstacle-Aware On-Track Bus Routing" (Leader)	2018
Second Place Award at ISPD Contest on "Initial Detailed Routing"	2018
Full Postgraduate Studentship at CUHK	2017–

PUBLICATIONS

Journal Papers

[J2] **Jingsong Chen**, Jian Kuang, Guowei Zhao, Dennis Huang, and Evangeline F.Y. Young, "PROS2.0: a Plug-in for Routability Optimization applied in the State-of-the-art Commercial EDA Tool Using Deep Learning" IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), 2022.

[J1] Bentian Jiang*, **Jingsong Chen***, Jinwei Liu, Lixin Liu, Fangzhou Wang, Xiaopeng Zhang, and Evangeline F.Y. Young, "CU.POKer: Placing DNNs on Wafer-Scale AI Accelerator with Optimal Kernel Sizing" IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), 2021 (* co-first authors).

Conference Proceedings

[C10] Weihua Xiao*, Shanshan Han*, Yue Yang, Shaoze Yang, Cheng Zheng, **Jingsong Chen**, Tingyuan Liang, Lei Li, and Weikang Qian, "MiniTNtk: An exact synthesis-based method for minimizing transistor network", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), San Francisco, CA, USA, Oct. 29–Nov. 2, 2023 (* co-first authors).

[C9] Jinwei Liu, Xiaopeng Zhang, Shiju Lin, Xinshi Zang, **Jingsong Chen**, Bentian Jiang, Martin D.F. Wong, and Evangeline F.Y. Young, "Partition and place finite element model on wafer-scale engine", Annual Design Automation Conference (**DAC**), San Francisco, CA, USA, July 10–14, 2022.

[C8] Tingyuan Liang, **Jingsong Chen**, Lei Li, and Wei Zhang, "AutoCellLibX: Automated Standard Cell Library Extension Based on Pattern Mining", arXiv preprint arXiv:2207.12314, 2022.

[C7] Fangzhou Wang, Lixin Liu, **Jingsong Chen**, Jinwei Liu, Xinshi Zang, and Martin D.F. Wong, "Starfish: An Efficient P&R Co-Optimization Engine with A*-based Partial Rerouting", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Munich, Germany, Nov. 1–4, 2021.

[C6] **Jingsong Chen**, Jian Kuang, Guowei Zhao, Dennis Huang, and Evangeline F.Y. Young, "PROS: a Plug-in for Routability Optimization applied in the State-of-the-art Commercial EDA Tool Using Deep Learning", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Online, Nov. 2–5, 2020.

[C5] Bentian Jiang*, **Jingsong Chen***, Jinwei Liu, Lixin Liu, Fangzhou Wang, Xiaopeng Zhang, and Evangeline F.Y. Young, "CU.POKer: Placing DNNs on Wafer-Scale AI Accelerator with Optimal Kernel Sizing", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Online, Nov. 2–5, 2020 (* co-first authors).

[C4] Haocheng Li, Gengjie Chen, Bentian Jiang, **Jingsong Chen**, and Evangeline F.Y. Young, "Dr. CU 2.0: A Scalable Detailed Routing Framework with Correct-by-Construction Design Rule Satisfaction", IEEE/ACM International Conference on Computer-Aided Design (**ICCAD**), Westminster, CO, USA, Nov. 4–7, 2019.

[C3] **Jingsong Chen**, Jinwei Liu, Gengjie Chen, Dan Zheng, and Evangeline F.Y. Young, "MARCH: Maze Routing Under a Concurrent and Hierarchical Scheme for Buses", Annual Design Automation Conference (**DAC**), Las Vegas, NV, USA, June 2–6, 2019.

[C2] **Jingsong Chen**, James Shiely, and Evangeline F.Y. Young, "Fast Detection of Largest Repeating Layout Pattern", SPIE Advanced Lithography Conference, San Jose, CA, USA, Feb. 24–28, 2019.

[C1] Gengjie Chen, Chak-Wa Pui, Haocheng Li, **Jingsong Chen**, Bentian Jiang, and Evangeline F.Y. Young, "Detailed Routing by Sparse Grid Graph and Minimum-Area-Captured Path Search", IEEE/ACM Asia and South Pacific Design Automation Conference (**ASPDAC**), Tokyo, Japan, Jan. 21–24, 2019.

GRADUATE-LEVEL COURSES

ENGG 5501: Foundations of Optimization
ENGG 5103: Techniques for Data Mining
CSCI 5160: Advanced Algorithms
CENG 5270: EDA for Physical Design of Digital System
ENGG 5781: Matrix Analysis Computations
CSCI 5150: Machine Learning Algorithm & Application
CSCI 5610: Advanced Data Structures

TECHNICAL SKILLS

Languages	C/C++, Python, LaTeX
Operating Systems	Linux/UNIX
Toolkits	Tensorflow