

# QI XU

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## RESEARCH INTERESTS

- Physical Design Automation, Machine Learning in EDA, Design for Reliability for 3-D Integrated Circuits, Neuromorphic Computing System

## EDUCATION

<b>University of Science and Technology of China, Hefei, China</b> Ph.D., Department of Electronic Science and Technology	Sep. 2012 – Jun. 2018
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## EXPERIENCE

<b>University of Science and Technology of China, Hefei, China</b> Associate Professor, School of Microelectronics	Nov. 2020 – Present
<b>Hefei University of Technology, Hefei, China</b> Lecturer, Department of Electronic Science and Technology	Jul. 2018 – Oct. 2020
<b>Southern University of Science and Technology, Shenzhen, China</b> Visiting Scholar, Department of Computer Science and Engineering	Jul. 2019 – Sep. 2019
<b>The Chinese University of Hong Kong, NT, Hong Kong</b> Research Assistant, Department of Computer Science and Engineering	Sep. 2017 – Nov. 2017

## SELECTED AWARDS AND HONORS

Outstanding Doctoral Dissertation	USTC	2018
Excellent Graduate Student	USTC	2018
National Scholarship	MOE of PRC	2010

## PUBLICATIONS

### Journal Papers

- [J30] Weiran Chen, **Qi Xu\***, Song Chen, Yi Kang, Bei Yu, “Scalable High-Fidelity Solver for Large-Scale ReRAM Crossbar Arrays Under I–V Nonlinearity”, accepted by ACM Transactions on Design Automation of Electronic Systems (**TODAES**), 2026.
- [J29] Rong Sun, **Qi Xu\***, Song Chen, Yi Kang, Bei Yu, “GoSteiner: Constructing Rectilinear Steiner Minimum Tree on Directed Graph”, accepted by ACM Transactions on Design Automation of Electronic Systems (**TODAES**), 2026.
- [J28] Donger Luo, Qi Sun, Peng Xu, Su Zheng, **Qi Xu**, Tinghuan Chen, Bei Yu, Hao Geng, “Attention-Based EDA Tool Parameter Explorer: From Hybrid Parameters to Multi-QoR Metrics”, accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**).
- [J27] Biao Liu, Chen Jiang, **Qi Xu**, Hailong Yao, Tsung-Yi Ho, Bo Yuan, “Efficient Routing-based Synthesis for Digital Microfluidic Biochips via Reinforcement Learning”, accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**).
- [J26] Weiran Chen, Zaitian Chen, Bei Yu, Song Chen, Yi Kang, **Qi Xu\***, “Real-Time Compensation Framework for Large-Scale ReRAM-Based Sparse LU Factorization”, accepted by IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**).
- [J25] **Qi Xu**, Lijie Wang, Jing Wang, Lin Cheng, Song Chen, Yi Kang, “Graph Attention-Based Symmetry Constraint Extraction for Analog Circuits”, IEEE Transactions on Circuits and Systems I: Regular Papers (**TCAS-I**), vol. 71, no. 8, pp. 3754-3763, 2024.

- [J24] Bo Yang, **Qi Xu\***, Hao Geng, Song Chen, Bei Yu, Yi Kang, “Floorplanning with Edge-Aware Graph Attention Network and Hindsight Experience Replay”, *ACM Transactions on Design Automation of Electronic Systems (TODAES)*, vol. 29, no. 3, pp. 56:1-56:17, 2024.
- [J23] Junpeng Wang, Mengke Ge, Bo Ding, **Qi Xu**, Song Chen, Yi Kang, “NicePIM: Design Space Exploration for Processing-In-Memory DNN Accelerators with 3D-Stacked-DRAM”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 43, no. 5, pp. 1456-1469, 2024.
- [J22] Bo Ding, Jinglei Huang, Junpeng Wang, **Qi Xu**, Song Chen, Yi Kang, “Task modules Partitioning, Scheduling and Floorplanning for Partially Dynamically Reconfigurable Systems with Heterogeneous Resources”, *ACM Transactions on Design Automation of Electronic Systems (TODAES)*, vol. 28, no. 6, pp. 103:1-103:26, 2023.
- [J21] Yongtian Bi, **Qi Xu\***, Hao Geng, Song Chen, Yi Kang, “AD<sup>2</sup>VNCS: Adversarial Defense and Device Variation-Tolerance in Memristive Crossbar-Based Neuromorphic Computing Systems”, *ACM Transactions on Design Automation of Electronic Systems (TODAES)*, vol. 29, no. 1, pp. 8:1-8:19, 2023.
- [J20] Xiaobing Ni, Mengke Ge, Yongjin Tao, Wendi Sun, Feixiang Duan, Xuefei Bai, **Qi Xu**, Song Chen, Yi Kang, “BusMap: Application Mapping with Bus Routing for Coarse-Grained Reconfigurable Array”, *IEEE Transactions on Circuits and Systems II: Express Briefs (TCAS-II)*, vol. 70, no. 8, pp. 3054-3058, 2023.
- [J19] Yongtian Bi, **Qi Xu\***, Hao Geng, Song Chen, Yi Kang, “Resist: Robust Network Training for Memristive Crossbar-Based Neuromorphic Computing Systems”, *IEEE Transactions on Circuits and Systems II: Express Briefs (TCAS-II)*, vol. 70, no. 6, pp. 2221-2225, 2023.
- [J18] Chen Jiang, Rongquan Yang, **Qi Xu**, Hailong Yao, Tsung-Yi Ho, Bo Yuan, “A Cooperative Multi-agent Reinforcement Learning Framework for Droplet Routing in Digital Microfluidic Biochips”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 42, no. 9, pp. 3007-3020, 2023.
- [J17] Junpeng Wang, Haitao Du, Bo Ding, **Qi Xu**, Song Chen, Yi Kang, “DDAM: Data Distribution-Aware Mapping of CNNs on Processing-In-Memory Systems”, *ACM Transactions on Design Automation of Electronic Systems (TODAES)*, vol. 28, no. 3, pp. 36:1-36:30, 2023.
- [J16] Bo Ding, Jinglei Huang, **Qi Xu**, Junpeng Wang, Song Chen, Yi Kang, “Memory-aware Partitioning, Scheduling, and Floorplanning for Partially Dynamically Reconfigurable Systems”, *ACM Transactions on Design Automation of Electronic Systems (TODAES)*, vol. 28, no. 1, pp. 7:1-7:21, 2023.
- [J15] **Qi Xu**, Junpeng Wang, Bo Yuan, Qi Sun, Song Chen, Bei Yu, Yi Kang, Feng Wu, “Reliability-Driven Memristive Crossbar Design in Neuromorphic Computing Systems”, *IEEE Transactions on Automation Science and Engineering (TASE)*, vol. 20, no. 1, pp. 74-87, 2023.
- [J14] **Qi Xu**, Hao Geng, Tianming Ni, Song Chen, Bei Yu, Yi Kang, Xiaoqing Wen, “Fortune: A New Fault-Tolerance TSV Configuration in Router-based Redundancy Structure”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 41, no. 10, pp. 3182-3187, 2022.
- [J13] **Qi Xu**, Hao Geng, Song Chen, Bo Yuan, Cheng Zhuo, Yi Kang, Xiaoqing Wen, “GoodFloorplan: Graph Convolutional Network and Reinforcement Learning Based Floorplanning”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 41, no. 10, pp. 3492-3502, 2022.
- [J12] **Qi Xu**, Wenhao Sun, Song Chen, Yi Kang, Xiaoqing Wen, “Cellular Structure-Based Fault-Tolerance TSV Configuration in 3D-IC”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 41, no. 5, pp. 1196-1208, 2022.
- [J11] Hao Geng, Yuzhe Ma, **Qi Xu**, Jin Miao, Subhendu Roy, Bei Yu, “High-Speed Adder Design Space Exploration via Graph Neural Processes”, *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*, vol. 41, no. 8, pp. 2657-2670, 2022.
- [J10] Mengke Ge, Xiaobing Ni, **Qi Xu**, Jinglei Huang, Song Chen, Yi Kang, Feng Wu, “Synthesizing Brain-Network-Inspired Interconnections for Large-Scale Network-on-Chips”, *ACM Transactions on Design Automation of Electronic Systems (TODAES)*, vol. 27, no. 1, pp. 9:1-9:30, 2021.
- [J9] **Qi Xu**, Song Chen, Hao Geng, Bo Yuan, Bei Yu, Feng Wu, Zhengfeng Huang, “Fault Tolerance in Memristive Crossbar-Based Neuromorphic Computing Systems”, *Integration, the VLSI Journal*, vol. 70, pp. 70-79, 2020.

- [J8] Tianming Ni, Hao Chang, Tai Song, **Qi Xu\***, Zhengfeng Huang, Huaguo Liang, et.al, “Non-intrusive Online Distributed Pulse Shrinking Based Interconnect Testing in 2.5D IC”, IEEE Transactions on Circuits and Systems II: Express Briefs (**TCAS-II**), vol. 67, no. 11, pp. 2657-2661, 2020.
- [J7] Song Chen\*, Mengke Ge, Zhigang Li, Jinglei Huang, **Qi Xu\***, Feng Wu, “Generalized Fault-Tolerance Topology Generation for Application Specific Network-on-Chips”, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), vol. 39, no. 6, pp. 1191-1204, 2020.
- [J6] Song Chen , Jinglei Huang, Xiaodong Xu, Bo Ding, **Qi Xu**, “Integrated Optimization of Partitioning, Scheduling, and Floorplanning for Partially Dynamically Reconfigurable Systems”, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), vol. 39, no. 1, pp. 199-212, 2020.
- [J5] **Qi Xu**, Hao Geng, Song Chen, Bei Yu, Feng Wu, “Memristive Crossbar Mapping for Neuromorphic Computing Systems on 3D IC”, ACM Transactions on Design Automation of Electronic Systems (**TODAES**), vol. 25, no. 1, pp. 8:1-8:19, 2019.
- [J4] Song Chen\*, **Qi Xu\***, Bei Yu, “Adaptive 3D-IC TSV Fault Tolerance Structure Generation”, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), vol. 38, no. 5, pp. 949-960, 2019.
- [J3] **Qi Xu**, Song Chen, Xiaodong Xu, Bei Yu, “Clustered Fault Tolerance TSV Planning for 3D Integrated Circuits”, IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (**TCAD**), vol. 36, no. 8, pp. 1287-1300, 2017.
- [J2] **Qi Xu**, Song Chen, “Fast Thermal Analysis for Fixed-outline 3D Floorplanning”, Integration, the VLSI Journal, vol. 59, pp. 157-167, 2017.
- [J1] **Qi Xu**, Song Chen, Bin Li, “Combining the Ant System Algorithm and Simulated Annealing for 3D/2D Fixed-Outline Floorplanning”, Applied Soft Computing, vol. 40, pp. 150-160, 2016.

#### Conference Papers

- [C17] Kai Ma, Zhen Wang, Hongquan He, **Qi Xu**, Tinghuan Chen, Hao Geng, “LMM-IR: Large-Scale Netlist-Aware Multimodal Framework for Static IR-Drop Prediction”, ACM/IEEE Design Automation Conference (**DAC**), San Francisco, Jun. 22–25, 2025.
- [C16] Weiran Chen, **Qi Xu\***, “Robust and Efficient Adversarial Defense in SNNs via Image Purification and Joint Detection”, IEEE International Conference on Acoustics, Speech, and Signal Processing (**ICASSP**), Hyderabad, India, Apr. 06-11, 2025.
- [C15] Lijie Wang, Jing Wang, Song Chen, **Qi Xu\***, “AIPlace: Analog IC Placement with Multi-Task Learning Framework”, IEEE/ACM Asian and South Pacific Design Automation Conference (**ASPDAC**), Tokyo, Japan, Jan. 20-23, 2025.
- [C14] Xinfeng Liu, Siting Liu, Bei Yu, Song Chen, **Qi Xu\***, “ThePlace: Thermal-Aware Placement With Operator Learning-Based Ultra-Fast Simulator”, IEEE/ACM Asian and South Pacific Design Automation Conference (**ASPDAC**), Tokyo, Japan, Jan. 20-23, 2025.
- [C13] Lin Chen, **Qi Xu**, Hu Ding, “OTPlace-Vias: A Novel Optimal Transport Based Method for High Density Vias Placement in 3D Circuits”, ACM/IEEE Design Automation Conference (**DAC**), San Francisco, Jun. 23-27, 2024.
- [C12] Bing Li, Wendi Sun, Xiaobing Ni, Kaixuan He, **Qi Xu\***, Song Chen\*, Yi Kang, “Parallel Multi-objective Bayesian Optimization Framework for CGRA Microarchitecture”, IEEE/ACM Proceedings Design, Automation and Test in Europe (**DATE**), Valencia, Spain, Mar. 25-27, 2024.
- [C11] Bo Yang, **Qi Xu\***, Hao Geng, Song Chen, Yi Kang, “Miracle: Multi-Action Reinforcement Learning-Based Chip Floorplanning Reasoner”, IEEE/ACM Proceedings Design, Automation and Test in Europe (**DATE**), Valencia, Spain, Mar. 25-27, 2024.
- [C10] Donger Luo, Qi Sun, **Qi Xu**, Tinghuan Chen, Hao Geng, “Attention-Based EDA Tool Parameter Explorer: From Hybrid Parameters to Multi-QoR metrics”, IEEE/ACM Proceedings Design, Automation and Test in Europe (**DATE**), Valencia, Spain, Mar. 25-27, 2024.
- [C9] Yang Xiao, **Qi Xu**, Bo Yuan, “Tolerating Device-to-Device Variation for Memristive Crossbar-Based Neuromorphic Computing Systems: A New Bayesian Perspective”, International Joint Conference on Neural Networks (**IJCNN**), Queensland, Australia, Jun. 18-23, 2023.

- [C8] Hao Geng, Qi Sun, **Qi Xu**, Tsung-Yi Ho, Bei Yu, “Mixed-type Wafer Failure Pattern Recognition”, IEEE/ACM Asian and South Pacific Design Automation Conference (**ASPDAC**), Tokyo Odaiba Miraikan, Jan. 16-19, 2023.
- [C7] Hao Geng, **Qi Xu**, Tsung-Yi Ho, Bei Yu, “PPATuner: Pareto-driven Tool Parameter Auto-tuning in Physical Design via Gaussian Process Transfer Learning”, ACM/IEEE Design Automation Conference (**DAC**), San Francisco, CA, Jul. 10-14, 2022.
- [C6] **Qi Xu**, Junpeng Wang, Hao Geng, Song Chen and Xiaoqing Wen, “Reliability-Driven Neuromorphic Computing Systems Design”, IEEE/ACM Proceedings Design, Automation and Test in Europe (**DATE**), Virtual Event, France, Feb., 2021.
- [C5] Junpeng Wang, **Qi Xu**, Bo Yuan, Song Chen, Bei Yu, Feng Wu, “Reliability-Driven Neural Network Training for Memristive Crossbar-Based Neuromorphic Computing Systems”, IEEE International Symposium on Circuits and Systems (**ISCAS**), Virtual Event, Spain, Oct., 2020.
- [C4] Mengke Ge, **Qi Xu**, Huajie Ruan, Xiaobing Ni, Song Chen, Yi Kang, “Synthesizing A Generalized Brain-inspired Interconnection Network for Large-scale Network-on-chip Systems”, ACM Great Lakes Symposium on VLSI (**GLSVLSI**), Virtual Event, China, Sep., 2020.
- [C3] **Qi Xu**, Song Chen, Bei Yu, Feng Wu, “Memristive Crossbar Mapping for Neuromorphic Computing Systems on 3D IC”, ACM Great Lakes Symposium on VLSI (**GLSVLSI**), Chicago, USA, May, 2018.
- [C2] Xiaodong Xu, **Qi Xu**, Jinglei Huang, Song Chen, “An Integrated Optimization Framework for Partitioning, Scheduling and Floorplanning on Partially Dynamically Reconfigurable FPGAs”, ACM Great Lakes Symposium on VLSI (**GLSVLSI**), Alberta, Canada, May, 2017.
- [C1] **Qi Xu**, Song Chen, Bin Li, “Ant system based 3D fixed-outline floorplanning”, IEEE International Conference on Solid-State and Integrated Circuit Technology (ICSICT), Guilin, China, Oct. 2014.

## TEACHING

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Spring 2024: ELEC6414P - Neural Networks and Applications - USTC  
 Spring 2025: ELEC6414P - Neural Networks and Applications - USTC

## PROFESSIONAL SERVICE

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### Editorial Board

- Associate Editor, Integration, the VLSI Journal, 2025-present
- Associate Editor, IEEE Technical Committee on Cyber-Physical Systems (TC-CPS) Newsletter, 2021-present

### Technical Program Committee Member

- IEEE International Symposium of Electronics Design Automation (ISED): 2025
- IEEE International Conference on Computer Design (ICCD): 2025

### Reviewer

- IEEE Transaction on Computer-Aided Design of Integrated Circuits and Systems (TCAD)
- ACM Transaction on Design Automation of Electronic Systems (TODAES)
- ACM/IEEE Design Automation Conference (DAC)
- Integration, the VLSI Journal