

YIFENG XIAO

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EDUCATION

University of Southern California (USC), Los Angeles, CA, U.S. Jan. 2021 - Present

Ph.D. in Ming Hsieh Department of Electrical and Computer Engineering

- GPA: 3.90/4.00; work with Prof. Pierluigi Nuzzo.
- Research interests: Design and verification of learning-based Cyber-Physical System (CPS), and machine learning.
- Relevant coursework: Machine Learning, Probability, Stochastic Process, Linear Algebra, Optimization, Nonlinear Control System, Analysis of Algorithms, Learning and Control for Safety-Critical Robotic Systems, etc.

Fudan University (FDU), Shanghai, China Aug. 2016 - Jul. 2020

B.E. in Microelectronic Science and Engineering

- GPA: 3.64/4.00; worked with Prof. Jianli Chen and Prof. Bei Yu.
- Research interests: Electronic design automation (EDA), and machine learning.

University of Sydney (USYD), Sydney, Australia Feb. 2019 - Jun. 2019

Exchange Student in the Department of Information and Computer Engineering

RESEARCH EXPERIENCE

Machine Learning-Based Circuit Block Identification for Comparative Analysis May. 2023 - Aug. 2023

Project Leader, Supervisor: Kim-Fung Chan, Micron Technology

- Designed an efficient feature extraction method on layout images with the Sobel filter.
- Constructed an image segmentation model to identify functional circuit blocks from circuit layouts.
- Computed area of different circuit blocks on layout images for comparative analysis.

Contract-Based Efficient Exploration of Cyber-Physical System Architectures Oct. 2021 - Sep. 2023

Advisor: Prof. Pierluigi Nuzzo, Viterbi School of Engineering, USC

- Modeled diverse design viewpoints for components and systems using Assume-Guarantee (A/G) contracts.
- Formulated design space exploration problem with mixed-integer linear program (MILP) coded in Gurobi.
- Conducted refinement checking and graph-based algorithm to exclude infeasible architectures efficiently.

Robustness Verification of Neural Network-Enabled CPS Apr. 2021 - Sep. 2021

Advisor: Prof. Pierluigi Nuzzo, Viterbi School of Engineering, USC

- Proposed robustness contract to model the input-output robustness of neural networks (NNs).
- Developed a framework for robustness verification with satisfiability modulo convex programming (SMC).
- Conducted robustness verification for NN-based perception on the MNIST dataset and applied compositional verification and sensitivity analysis in a reinforcement learning-enabled mountain car system.

Graph-based Automated Reference Placement for Printed Circuit Board (PCB) Design Aug. 2020 - Mar. 2021

Advisor: Jianli Chen, School of Microelectronics, FDU

- Designed a graph-based data structure for efficient PCB netlist analysis.
- Utilized graph isomorphism algorithms to detect similar designs in the netlist.
- Developed a subgraph matching technique for automated reference placement.

Low-Cost Hotspot Detection with Active Entropy Sampling Dec. 2019 - Apr. 2020

Advisor: Bei Yu, Department of Computer Science and Engineering, The Chinese University of Hong Kong (CUHK)

- Processed layout data into clips and performed feature extraction using principal component analysis.
- Developed an entropy-based selection technique that considered model uncertainty and data diversity.
- Applied an active learning framework for hotspot detection, resulting in higher accuracy and less time consumption.

TEACHING AND INTERNSHIPS

Micron Technology
Machine Learning Intern

May 2023 - Aug 2023

USC AutoDrive Lab

Sep. 2021 - Present

Mentor for USC Viterbi Center for Undergraduate Research in Viterbi Engineering (CURVE) Program

- Build simulation-based and experimental testbeds to emulate realistic scenarios for self-driving vehicles.

DesCyPhy Lab

Jun. 2022 - Jul. 2022

Mentor for 2022 USC Viterbi Summer High School Intensive in Next-Generation Engineering (SHINE) Program

- Conduct robustness verification for the traffic sign classification system with Z3.

USC Viterbi Graduate Mentorship Program

Aug. 2022 - Nov. 2022

PUBLICATION

Conference Papers

1. Xiao, Y., Oh, C., Lora, M. & Nuzzo, P. (2023), "Efficient Exploration of Cyber-Physical System Architectures Using Contracts and Subgraph Isomorphism", DATE 2024 (**Best Paper Candidate**).
2. Su, M., Xiao, Y., Zhang, S., Su, H., Xu, J., He, H., ... & Chang, Y. W. (2022), "Late Breaking Results: Subgraph Matching Based Reference Placement for PCB Designs", DAC 2022. [\[PDF\]](#)
3. Xiao, Y., Su, M., Yang, H., Chen, J., Yu, J., & Yu, B. (2021, December), "Low-Cost Lithography Hotspot Detection with Active Entropy Sampling and Model Calibration", DAC 2021. [\[PDF\]](#)
4. Ma, C., Xiao, Y., Wang, S., Yu, J., & Chen, J. (2021, October), "CongestNN: A Bi-Directional Congestion Prediction Framework for Large-Scale Heterogeneous FPGAs", ASICON 2021. [\[PDF\]](#)

AWARD

2023 DAC young fellowship
2020 Outstanding Graduates of Shanghai (2/122)
2019 National IC Design Competition - First Prize for Undergraduate Group
2018 SCSK Corporation Scholarship (1/122)
2018 Undergraduate Excellence Scholarship of FDU

TECHNICAL SKILLS

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|----------------------------------|---|
| Languages: | English (Proficient), Chinese (Native) |
| Programming: | Python, C/C++, Verilog, Java, Perl |
| Software & Platforms: | Pytorch, Robot Operating System (ROS), MATLAB, Tensorflow, Gurobi, Z3, Latex, Cadence, Vivado |