ZHENGQI, GAO

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EDUCATION

Massachusetts Institute of Technology Cambridge, USA

Ph.D. in Electrical Engineering and Computer Science Sep 2021 – Jun 2025 (Expected)

- Supervisor: Prof. Duane Boning
- Research interests: design automation for photonic integrated circuits (PICs), and machine learning,

Fudan University Shanghai, China

M.S. in Microelectronics and Solid State Electronics Sep 2018 – Jun 2021

- GPA: 3.82/4.00 (Rank: NA); worked with Prof. Jun Tao and Prof. Xin Li (Duke Univ.)
- Research interests: electronic design automation (EDA), statistical methods (e.g., Bayesian methods), numerical optimization, and machine learning

B.E. in Microelectronic Science and Engineering Sep 2014 – Jun 2018

- GPA: 3.84/4.00 (Rank: 4/71); selected to Elite Engineering Program (top 5%)
- Relevant coursework: Mathematical Analysis, Probability, Mathematical Statistics and Stochastic Process, Signal and System, Data Structure and Algorithm Design, Design of Analog Integrated Circuits

PUBLICATIONS

1. S. Ren, **Z. Gao**, T. Hua, Z. Xue, Y. Tian, S. He and H. Zhao, "Co-advise: cross inductive bias distillation," *Arxiv Preprint*. [PDF]
2. Z. Xue, S. Ren, **Z. Gao** and H. Zhao, "Multimodal knowledge expansion," *IEEE International Conference on Computer Vision (ICCV)*, Oct. 2021. [PDF]
3. **Z. Gao** and R. Rohrer, "Efficient non-Monte-Carlo yield estimation," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (*IEEE TCAD*). [PDF]
4. **Z. Gao**, J. Tao, Y. Su, D. Zhou, X. Zeng and X. Li, "Fast statistical analysis of rare failure events with truncated normal distribution in high-dimensional variation space," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (*IEEE TCAD*). [PDF]
5. **Z. Gao**, Z. Chen, J. Tao, Y. Sun, D. Zhou, and X. Zeng, "Bayesian inference on introduced general region: an efficient parametric yield estimation method for integrated circuits," *ACM/IEEE Asia and South Pacific Design Automation Conference* (*ASPDAC*), Jan. 2021. [PDF]
6. **Z. Gao**, J. Tao, D. Zhou, X. Zeng and X. Li, "Efficient rare failure analysis over multiple corners via correlated Bayesian inference," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (*IEEE TCAD*), Oct. 2020. [PDF] [Code]
7. **Z. Gao**, J. Tao, D. Zhou and X. Zeng, "Efficient parametric yield estimation over multiple process corners via Bayesian inference based on Bernoulli distribution," *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems* (*IEEE TCAD*), Oct. 2020. [PDF] [Code]
8. J. Shi, **Z. Gao**, J. Tao, Y. Su, D. Zhou and X. Zeng, "Multi-corner parametric yield estimation via Bayesian inference on Bernoulli distribution with conjugate prior," *IEEE International Symposium on Circuits and Systems* (*ISCAS*), Oct. 2020. [PDF]
9. Y. Li, X. Zeng, **Z. Gao**, L. Lin, J. Tao, J. Han, X. Cheng, M. Tahoori and X. Zeng, "Exploring a Bayesian optimization framework compatible with digital standard flow for soft-error-tolerant circuit," *IEEE/ACM Design Automation Conference* (*DAC*), Jul. 2020. [PDF]
10. **Z. Gao**, J. Tao, Y. Su, D. Zhou and X. Zeng, "Projection based active Gaussian process regression for Pareto Front modeling," *Arxiv Preprint*. [PDF]
11. **Z. Gao**, J. Tao, F. Yang, Y. Su, D. Zhou and X. Zeng, "Efficient performance trade-off modeling for analog circuit based on Bayesian neural network," *IEEE/ACM International Conference on Computer Aided Design* (*ICCAD*), Nov. 2019. [PDF]
12. J. Tao, **Z. Gao**, D. Zhou and X. Zeng, "Efficient statistical analysis for correlated rare failure events," *IEEE International Conference on Solid-State and Integrated Circuit Technology* (*ICSICT*), Nov. 2018. [PDF]

RESEARCH EXPERIENCE

Massachusetts Institute of Technology — Cambridge, USA
Research Assistant to Prof. Duane Boning — Sep 2021 – Jun 2025 (expected)

- Optimized silicon photonic devices

Shanghai Qizhi Institute — Shanghai, China
Research Assistant to Prof. Hang Zhao — Mar 2021 – Jun 2021

- Exploited multimodal learning under knowledge distillation
- Developed a method to address adversarial attack by utilizing the multimodal data

Southern Methodist University — Remotely
Research Assistant to Prof. Ron Rohrer — May 2020 – Sep 2021

- Built a power grid DC simulator for the electromigration problem
- Analyzed parametric yield based on the adjoint method

Fudan University (State Key Laboratory of ASIC & System) — Shanghai, China
Research Assistant to Prof. Jun Tao (in collaboration with Prof. Xin Li) — Sep 2016 – Jul 2021

- Exploited a graph neural network for graph similarity tasks
- Improved post-silicon yield estimation with the domain adaptation technique (published in *ASPDAC*'21)
- Estimated multi-corner failure rate and yield with Bayesian inference (both published in *IEEE TCAD*)
- Modeled performance trade-off of analog circuits based on a Bayesian neural network (published in *ICCAD*'19)
- Optimized a time variant analog filter by hierarchical clustering (bachelor thesis)
- Developed an SRAM failure-rate estimation tool in collaboration with Prof. Xuan Zhang (WUSTL) [see here]

TEACHING AND INTERNSHIPS

Fudan University (FDU) and Duke Kunshan University (DKU) — China
Teaching Assistant — Sep 2019 – Mar 2020

- Performed TA duties for Design of Analog Integrated Circuits at FDU (instructor: Prof. Jun Xu) and Introduction to Programming & Data Structure at DKU (instructor: Prof. Dennis Quan [Duke Univ.])

Baidu Inc. — Shanghai, China
Quality Assurance (QA) Engineering Intern — Jun 2017 – Sep 2017

- Measured the robustness of programs and took charge of the FEEDS project

SELECTED AWARDS AND HONORS

- Outstanding Graduates of Shanghai (top 5%) — 2021
- National Scholarship, Fudan University (top 1%) — 2020
- Rising Star of Academic, Fudan University (awarded to 11 graduate students majoring in Sci. & Engi.) — 2020
- Pacemaker to Merit Student, Fudan University (awarded to 15 graduate students) — 2019
- First Prize Scholarship, Fudan University (top 5%) — 2019
- National Gold Award, China "Internet+" College Student Innovation & Entrepreneur Competition(top 5%) — 2018
- National 2nd Prize, China Post-Graduate Mathematical Contest in Modeling (top 15%) — 2018
- Outstanding Undergraduates of Shanghai (top 5%) — 2018
- Meritorious Winner, American Mathematical Contest in Modeling (top 13%) — 2017
- Top 11%, 2017 IEEE Xtreme Global Programming Competition (out of 3,350 teams worldwide) — 2017
- First Prize Scholarship, Fudan University (top 5%) — 2015, 2016, 2017
- National 2nd prize, China Mathematical Contest in Modeling (top 15%) — 2016

REPRESENTATIVE PROJECTS

***PRML* Solution Manual (GitHub 700+ Stars)** — Shanghai, China
An Original Solution Manual for Pattern Recognition and Machine Learning (PRML) — Sep 2017 – Present

- Solved nearly all exercises in *PRML* [see here]
- Communicated with people globally via email, helping them solve problems relevant to *PRML*

Auto-Grading System — Kunshan, China
An Auto-Grading System Developed at DKU — Jan 2020 – Mar 2020

- Led a small TA group to peruse the source code of Submitty

- Developed a fully automatic grading system based on Submitty

"Dr. Stanley's House" (Puzzle Video Game) Written in Haskell Shanghai, China
Final Project for Introduction to Functional Programming: From C/C++ to Haskell Sep 2018 – Jan 2019

- Implemented the game with a complete plot via Haskell [see here]
- Organized the program structure, sorted the logic, and set the schedule as the team leader
- Exploited Haskell libraries (e.g., SDL2, SDL2-ttf, and SDL2-mixer) to add music and animation

Real-Time Temperature Monitoring System Design Shanghai, China
Final Project for Electronic System Design Mar 2017 – Jun 2017

- Designed and created a double bridge circuit on PCB for temperature signal amplification and filtering
- Programmed STC single-chip microcomputer to sample and quantize temperature signal
- Designed host computer application using MATLAB to monitor and visualize temperature record

ADDITIONAL INFORMATION

Computer and Language Skills

- **Programming languages & Software**: C/C++, MATLAB, Python, Linux, Java, Haskell, HSPICE, SPECTRE
- **Languages**: Mandarin Chinese (native), English (proficient, TOEFL: 104 [Speaking: 23], GRE: 330+3.5)

Academic Service

- Independent reviewer for *IEEE TCAD*