Tianyun Zhang

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Education

Carnegie Mellon University **Aug 2023 - Expected 2027**
Ph.D. Electrical and Computer Engineering

Carnegie Mellon University **Aug 2023 - May 2025**
M.S. Electrical and Computer Engineering

University of Illinois at Urbana-Champaign **Aug 2020 - May 2023**
B.S. Computer Science + Economics, minors in Applied Statistics, Mathematics *GPA: 3.95/4.00*

Relevant Coursework: Computer Architecture, Computer System Organization, System Programming, Numerical Optimization, Data Structures, Software Design, Machine Learning for Signal Processing, Natural Language Processing

Publications

E. Tang, **T. Zhang**, W. Bradford, F. Siddique, J. C. Hoe, K. Skadron, F. Franchetti, "Hardware-Software Co-Design of Iterative Filter-Update Numerical Methods Using Processing-In-Memory", submitted to IEEE Supercomputing (SC) International Workshop on Memory System, Management and Optimization (MEMO), 2025 (accepted)

T. Zhang, F. Franchetti, "Towards an End-to-End Processing-in-DRAM Acceleration of Spectral Library Search", SRC TECHCON, 2025

E. Tang, **T. Zhang**, W. Bradford, F. Siddique, J. C. Hoe, K. Skadron, F. Franchetti, "Hardware-Software Co-Design of Iterative Filter-Update Numerical Methods Using Processing-In-Memory", IEEE Cross-disciplinary Conference on Memory-Centric Computing (CCMCC), 2025, Extended abstract

T. Zhang, E. Tang, F. Siddique, K. Skadron, F. Franchetti, "Towards an End-to-End Processing-in-DRAM Acceleration of Spectral Library Search", IEEE High Performance Extreme Computing Conference (HPEC), 2024, Extended abstract with poster presentation

Research Interests

Investigations into hardware-software co-design for novel computer architectures and making data-centric hardware systems more accessible to programmers.

Research Experience

Carnegie Mellon University **Aug 2023 - Present**
Advisor: Prof. Franz Franchetti
Graduate Research Assistant

- Exploring efficient filtering and computation with quantized low-precision number representations for in-memory computing, focusing on applications in bioinformatics (mass spectrometry) and machine learning (numerical algorithms)

ARCANA Research Group at University of Illinois **Jan 2022 - May 2023**
Advisor: Prof. Saugata Ghose
Undergraduate Researcher

- Researched programming models for processing-in-memory (PIM) applications, i.e. MapReduce algorithm on ReRAM

Gies College of Business at University of Illinois **June 2021 - May 2022**
Advisor: Prof. June-Young Kim
Research Assistant

- Automated financial transcript collection and cleaning; analyzed sentiment to assess impact on company performance

Professional Experience

KQ Capital **June 2023 - Aug 2023**
Venture Capital Intern

- Performed market research and analysis to assess potential investments within the computer hardware industry
- Evaluated startup pitches, providing specialized insights into their technical innovations and market potential

Amazon **May 2022 - Aug 2022**
Software Development Engineer Intern

- Processed data and built interface of seller product applications for internal customers
- Accomplished technical stack migration to centralize rendering logic and decrease build time from minutes to seconds

Professional Experience Ctd.

BP **June 2021 - Dec 2021**

Digital Security AI Developer Intern

- Developed virtual assistant to monitor automation system remote access, improving service efficiency via usage stats
- Worked with Process Control Network (PCN) architecture using Azure DevOps CI/CD pipeline

Leadership and Teaching

Machine Learning for Signal Processing Staff **June 2025 - Present**

Instructor

- Designing and developing lesson plans and lecture materials on advanced signal-processing applications of machine learning (e.g. survival analysis models)
- Authoring project briefs and homework problem sets reinforcing concepts like clustering and quantization

Engineering Community Outreach **Jan 2024 - May 2024**

Instructor

- Fostered connections between Carnegie Mellon and the Pittsburgh community by delivering STEM curriculum to K-12 students, e.g. introduction to microcontrollers
- Applied pedagogy and classroom management practices to create an engaging learning environment for students from mixed socioeconomic backgrounds and experiences with math, science, and coding

Women in CyberSecurity (WiCyS) at Illinois **Sept 2020 - May 2023**

President *Jul 2022 - May 2023*

- Led university chapter; bridged campus and national WiCyS to increase professional development and mentorship

Vice President *Aug 2021 - Jul 2022*

- Established communication with 10+ companies and obtained WiCyS's first sponsorship funding from industry
- Organized technical workshop collaborations with corporate sponsors drawing over 60 members in attendance

Technical Chair *Sept 2020 - Aug 2021*

- Planned and presented bi-monthly technical workshops for members, e.g. workshops introducing command line security challenges, cryptography, steganography
- Managed team creating top-down 2D game with JavaScript to teach K-12 students security

CS 433 Computer System Organization Staff **Jan 2023 - May 2023**

Course Grader

- Aided development of homework and exam questions testing conceptual understanding of computer architecture
- Designed grading rubrics and prepared personalized feedback on assignments

CS 196 Freshman Honors Staff **Jan 2021 - Dec 2021**

Project Manager

- Led 3 teams of 5 students on stock trend analysis, scheduling, and music preference web apps
- Created coding tutorials and weekly workstreams for team under scrum-based agile framework

CS 125 Introduction to Computer Science Staff **Jan 2021 - May 2021**

Course Assistant

- Mentored students on Java coding homework and projects; led discussion-style tutorials

Illinois Business Consulting **Sept 2020 - May 2021**

Consultant

- Advised insurance agency, identifying advantageous statistical and ML models to improve risk aggregation analysis
- Delivering insights through weekly PowerPoint presentations and created innovative Blender animations to symbolically visualize risk

Projects

Neural Code Generation for Scientific Computing Kernels **April 2025**

- Investigated reasoning capabilities of LLMs (GPT-4o, Gemini 2.5 Pro) for generating BLAS, FFT, and NTT kernels
- Benchmarked correctness and performance against MKL, cuBLAS, FFTW, and rule-based SPIRAL generated libraries

Pittsburgh RAG **March 2025**

- Developed retrieval-augmented generation (RAG) for domain-specific QA with LangChain, comparing Llama, Qwen, and Gemma LLMs with Nomic and GTE embeddings; built custom web scraping tools (BeautifulSoup, Hyperbrowser)

Skills

Technical Skills: architectural simulation, performance modeling, memory systems, machine learning
Programming Languages: C, C++, Python (PyTorch), R, Java, Bash, C#, Kotlin, TypeScript
Languages: English (Native), Chinese (Native), French (Intermediate), German (Beginner)

Honors

Carnegie Institute of Technology Dean's Fellow (CMU) **2023**
Procter & Gamble Excellence in Leadership Award **2023**
Women in CyberSecurity Conference Scholarship **2021, 2022**
JP Morgan Chase Women in Computer Science Scholarship **2021**
Gold Medalist, The National French Contest **2020**
Violin Distinction, Associated Board of the Royal Schools of Music **2018**

Affiliated Organizations

First Violinist, **CMU All University Orchestra (AUO)**
Member (Former Student Chapter President), **Women in CyberSecurity (WiCyS)**
Member, **Association for Computing Machinery (ACM) SIGARCH**
Member, **Institute of Electrical and Electronics Engineers (IEEE)**
Member, **Society of Women Engineers (SWE)**
Member, **Phi Beta Kappa Society**