Jennifer Brana

PhD Student, Carnegie Mellon University

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Research Interests

I am interested in the design and optimization of highly parallel computer architectures. My current research focuses on performance analysis and scheduling mechanisms for parallel architectures, with the goal of making general-purpose spatial architectures practical.

Research areas: computer architecture; parallel programming; compilers; performance modeling & analysis.

Education

Carnegie Mellon University — *Pittsburgh, PA*

Ph.D in Computer Science — *June 2023 - Present*

Advisor: Nathan Beckmann

University of Portland — *Portland, OR*

B.S. in Computer Science, *Cum Laude* — *Aug. 2019 - May 2023*

Minor in Computer Engineering.

Publications

Harmony: Co-Optimizing Parallelism and Locality to Bound Performance — *YARCH 2025*

Jennifer Brana, Nathan Beckmann

Kobold: Simplified Cache Coherence for Cache-Attached Accelerators — *IEEE CAL 2023*

Jennifer Brana, Brian C. Schwedock, Yatin A. Manerkar, Nathan Beckmann

Kobold: Simplified Cache Coherence for Cache-Attached Accelerators — *WDDSA @ MICRO 2022*

Jennifer Brana, Brian C. Schwedock, Yatin A. Manerkar, Nathan Beckmann

Honors & Awards

2023 **NSF Graduate Research Fellowship**, National Science Foundation
2023 **Cum Laude**, University of Portland
2023 **Outstanding Student Award**, Computer Science Department, University of Portland
2020 **Tau Beta Pi Induction**, Oregon Gamma, University of Portland
All terms **Dean's List**, University of Portland
2019-2023 **President's Scholarship**, University of Portland
2019-2023 **FIRST Robotics Scholarship**, University of Portland

Professional Experience

Carnegie Mellon University — *Pittsburgh, PA*

Graduate Research Assistant — *June 2023 - Present*

- Researching in computer architecture and computer systems.

AMD — *San Jose, CA*

Research Intern — *June 2024 - August 2024*

- Researching near-cache computing systems.
- Mentor: Alireza Kaviani

Carnegie Mellon University — *Pittsburgh, PA*

Undergraduate Research Assistant — *May 2022 - May 2023*

- Researched design methodologies for novel cache coherence protocols and designed protocols for cache-attached accelerators.
- Worked with Prof. Nathan Beckmann as part of the REU in Software Engineering.

Team Lift — *Portland, OR; Karonga, Malawi*
Senior Capstone — *Aug. 2022 - May 2023*
- Designed a connected network of sensors and computation nodes for an infrastructure-limited environment in Malawi, Africa.

University of Portland — *Portland, OR*
Undergraduate Researcher — *Jan. 2022 - May 2022*
- Investigated CPU specialization methods to increase the performance and efficiency of Viterbi Decoding.

Intelligent, Complex, Adaptive, and Networks Lab — *University of Portland*
Undergraduate Research Assistant — *May 2021 - August 2021*
- Researched EEG-based view of comprehension of truth statements to understand how humans process undefined statements.

Talks and Presentations

Harmony: Co-Optimizing Parallelism and Locality to Bound Performance — *YARCH 2025 @ ASPLOS*
Kobold: Coherence for Near-Cache Accelerators — *CMU PDL Workshop, 7 Nov. 2023*
Kobold: Simplified Cache Coherence for Cache-Attached Accelerators — *WDDSA @ MICRO, 2 Oct. 2022*
Kobold: Simplified Cache Coherence for Cache-Attached Accelerators — *SRC @ MICRO, 3 Oct. 2022*
Comparison of Computer Architecture Specialization Methods for Performance and Power Efficiency — *University of Portland Founders' Day, 12 April 2022*

Service & Leadership

Doctoral Review Committee — *Carnegie Mellon University CSD*
Graduate Student Representative — *Spring 2025 - Present*

Graduate Student Assembly — *Carnegie Mellon University*
Computer Science Department Representative — *Fall 2023 - Fall 2024*

PhD Open House Committee — *Carnegie Mellon University*
Member — *Spring 2024*

Tau Beta Pi — *University of Portland*
Oregon Gamma Chapter President — *2021 - 2022*

Society of Women Engineers — *University of Portland*
Mentor — *2020 - 2023*

Mentoring

Research Advising

Bas Yoovidhya (CMU CS masters thesis student) — *Fall 2023 - Summer 2024*
Mayne Mei (University of Michigan CS undergraduate, co-advised with Prof. Yatin Manerkar) — *Fall 2023*

Teaching

University of Portland

Theory of Computation (CS 357) — *Grader, Fall 2022*
Electrical Engineering Dept. Tutor (EE 231, 261, 262, & 332) — *Tutor, 2021-2022*
Logic Design (EE 231) — *Grader, Fall 2021*
Electrical Circuits Lab (EE 271) — *Lab Assistant, Spring 2021*

Skills

Programming Languages	C, C++, Python, Java, Assembly (including RISC-V), MATLAB, Haskell, Verilog HDL, LaTeX
Parallel Computing	Experience in parallel algorithm design and programming using CUDA, OneTBB, and pthreads
Computer Architecture Tools	Experience using gem5, SLICC, McPat, Murphi Model Checker, CACTI, ProtoGen/HieraGen, Pin tools
Other	Proficiency with Unix, SSH, Git/Github, Xcode, VSCode. Experience with LLVM