Jennifer Brana

Incoming PhD Student, Carnegie Mellon University

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Research Interests

I am interested in the intersection of hardware and software systems, particularly in the area of parallel computing and heterogeneous systems. My aim is to increase the scalability and sustainability of future computing systems.

Research areas: computer architecture; computer systems; memory systems; sustainability.

Education

Carnegie Mellon University — *Pittsburgh, PA*

Ph.D in Computer Science — *Beginning June 2023*

Advisor: Nathan Beckmann

University of Portland — *Portland, OR*

B.S. in Computer Science (3.9 GPA), *Cum Laude* — *Aug. 2019 - May 2023*

Minor in Computer Engineering.

Publications

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

Jennifer Brana, Brian C. Schwedock, Yatin A. Manerkar, Nathan Beckmann — *to appear*

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

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

Talks and Presentations

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*

Professional Experience

Computer Organization Research Group (CORGi) — *Carnegie Mellon University*

Undergraduate Research Assistant — *May 2022 - Present*

- Researched methods to minimize the impact of accelerator integration in the cache hierarchy.
- Designed novel non-inclusive hierarchical cache coherence protocol for near-cache accelerators.
- Utilized HieraGen to simplify concurrent protocol design and formally verified protocols using the Murphi model checker.
- Built discrete-event cache simulator using Python and implemented protocols using SLICC in gem5 for performance analysis.

Team Lift — *Portland, OR; Karonga, Malawi*

Senior Capstone — *Aug. 2022 - May 2023*

- Collaborated in a team of 5 students to design a cyber-physical system to monitor and control an autonomous irrigation system.
- Deployed a connected network of sensors and computation nodes in 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.
- Simulated processor architecture using gem5 and modeled processor power consumption using McPat.
- Performed low-level algorithm optimizations using RISC-V assembly language and augmenting C programs with in-line assembly.

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.
- Developed experimental framework and synchronization mechanisms for conducting experiments.

Honors & Awards

2023 **NSF Graduate Research Fellowship,** GRFP *NSF*

2023 **CS Outstanding Student Award,** For combination of coursework, research, and service. *U of Portland*

2020 **Tau Beta Pi Induction,** National engineering honor society. *U of Portland*

2019-2023 **Dean's List** *U of Portland*

Service & Leadership

Tau Beta Pi *University of Portland*

Oregon Gamma Chapter President *2021 - 2022*

- Responsible for planning meetings and activities to engage club members ranging from career development to design competitions.

Society of Women Engineers *University of Portland*

Mentor *2020 - 2023*

- Mentored freshman girls in the engineering program.

Tutoring Working Group *University of Portland*

Student Representative *2021*

- Worked with faculty members to redesign the tutoring program for the Shiley School of Engineering following the Covid-19 pandemic to increase freshman and sophomore retention rates.

Teaching

University of Portland

Theory of Computation (CS 357) *Grader, Fall 2022*

Digital Systems Design (EE 332) *Tutor, Spring 2022*

Signals & Systems (EE 262) *Tutor, Spring 2022*

Logic Design (EE 231) *Grader and Tutor, Fall 2021*

Electrical Circuits (EE 261) *Tutor, Fall 2021-Spring 2022*

Electrical Circuits Lab (EE 271) *Lab Assistant, Spring 2021*

Skills

Programming Languages C, C++, Python, Java, Assembly, MATLAB, Haskell, Verilog HDL, LaTeX

Parallel Programming Experience in parallel/GPU computing using CUDA C/C++, OneTBB

Computer Architecture Tools Experience using gem5, SLICC, McPat, Murphi model checker, CACTI, ProtoGen/HieraGen

Other Proficiency with Unix, SSH, Git/Github, Xcode, VSCode. Experience in Agile