Hugh Palin

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Education

University of Illinois at Urbana-Champaign Aug. 2022 – May 2026
B.S in Computer Engineering, Minor in Business *GPA: 3.62/4.00*

Experience

Lead Instructor May 2025 – Aug. 2025
iD Tech at Northwestern University *Evanston, IL*

- Taught middle and high school students artificial intelligence concepts in Python, leveraging TensorFlow to train custom image recognition models that classified real-world inputs such as hand gestures and drawings
- Instructed students in C++ programming for VEX robotics, covering motor control, sensor integration, and mechanical systems to build competitive battle-ready robots
- Led a team of instructors, mentored new instructors, and managed daily classroom operations at iD Tech

Undergraduate Research Assistant May 2024 – Aug. 2024
Northwestern University *Evanston, IL*

- Conducted research focused on identifying pathways to catalyze reactions yielding value-added products, such as pharmaceuticals or biofuels. Leveraged computational modeling to evaluate the feasibility of reactions
- Designed a Python workflow to automate the generation of molecular structures for simulating enzymatic reactions, reducing manual input by 99%. Ensured seamless integration with downstream machine learning models
- Leveraged high-performance computing to conduct large-scale enzyme-substrate interaction simulations, using a combination of QM and MM techniques to optimize computational runtime while preserving accuracy in results

Database Intern May 2023 – Aug. 2023
SC Johnson & Son, Inc. *Racine, WI*

- Developed a digital cataloging system to transition paper-based reports into a structured, searchable database, leveraging Python for data extraction and automation to enhance accessibility and visualization
- Optimized and updated a full-text search database using SQL and metadata indexing, enabling keyword-based document retrieval with optimized query performance

Projects

Custom RISC-V Operating System | *RISC-V, C* Mar. 2025 – May. 2025

- Designed a custom operating system with a shell interface to interact with a file system and launch user programs
- Built core OS components including scheduling, memory management, and device drivers with UART and virtio, incorporating support for interrupts and memory-mapped I/O in a large codebase
- Implemented process scheduling and forking and context switching to support multi-tasking across user programs
- Integrated a filesystem with multi-process and file descriptor support across isolated memory spaces
- Developed memory management modules with paging and virtual memory to allocate resources efficiently

Shell Shockers | *System Verilog, C* Oct. 2024 – Nov. 2024

- Designed a turn-based tank game inspired by Shell Shock Live on an FPGA, incorporating an interactive menu, randomized wind patterns, real-time scorekeeping, and physics-based projectile motion
- Developed a high-performance VGA-based graphical interface leveraging BRAM for efficient color storage and custom modules for precise VGA controller programming, allowing reuse of sprites
- Integrated a softcore MicroBlaze processor for USB keyboard input via SPI communication, enabling responsive and intuitive game control, using the MAX3421E USB peripheral controller to take in keyboard inputs

Convolutional Neural Network | *C* Oct. 2024 – Nov. 2024

- Developed and implemented the forward propagation of a CNN based on the LeNet-5 architecture for accurate recognition of hand-written digits, employing advanced machine learning techniques
- Significantly enhance training and testing speeds, using parallel programming techniques on an A40 GPU such as cuBLAS and matrix multiply with shared memory tiling

Technical Skills

Languages: C, C++, Python, CUDA, SystemVerilog, VHDL, RISC-V assembly, LC-3, Java, HTML/CSS, SQL
Developer Tools: Bash, Git, Docker, Visual Studio Code, Linux, Vivado, Quartus, KiCad, GDB, Valgrind, Qemu
Data Tools & Libraries: Microsoft Excel, ChimeraX, Tensorflow, Keras, NumPy, Pandas, Scikit, Matplotlib