Hanran Wu

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Summary

Senior undergraduate CS major student looking for System/ML Software Engineer intern opportunities from May 2024 to August 2024

Education

Georgia Institute of Technology — Atlanta, GA

Master of Science in Computer Science, Specialized in Systems — *Aug. 2024 (Expected) – Dec. 2025 (Expected)*

Bachelor of Science in Computer Science, Minor in Robotics — *Aug. 2020 – May 2024 (Expected)*

- GPA: 3.97/4.00
- Faculty Honors (received 7 times), Dean's List (received 8 times), IEEE-HKN, Omicron Delta Kappa, Phi Sigma Pi
- Teaching Assistant for **CS 2200 Systems and Networks** (2022/05 - 2022/12), led recitations of 50 students, covered C programming, interrupts, pipelined processors, virtual memory, process scheduling, multithreading, networking, File I/O

Courses

Graduate Level: Operating System, Deep Learning, Computer Vision, Natural Language Processing, Machine Learning
Senior Level: Data Structures&Algorithms, Software Engineering, Robotics, Database Management, Compiler, Computer Architecture, Embedded Systems, Control Systems, Automata and Computation Complexity, Computer Graphics, Digital Design

Technical Skills

Languages(Proficient): Python, C++, C, Java, SQL, SystemVerilog, MATLAB, VHDL, JavaScript, x86 assembly, Rust
Technologies: Git, SQL Server, Linux, GDB/LLDB, GCC, QEMU, CMake, Docker, FPGA, FreeRTOS, CI/CD, Azure, Kubernetes
Frameworks/Libraries: Pandas, PyTorch, NumPy, OpenMPI, gRPC, Scikit-Learn, OpenCL, OpenCV, CUDA, React, Flask, Node.js

Work Experience

GPU System Software Developer — Jan. 2024 - Present

*High Performance Architecture Lab @ Georgia Tech, advised by **Professor Hyesoon Kim*** — *Atlanta, GA*

- Adding virtual memory feature for the **FPGA**-based Vortex General-Purpose GPU which uses **RISC-V ISA**; Testing and benchmarking performance on simX(a cycle-level simulator), and RTL simulation on FPGA using **C++** and **SystemVerilog**

Software Engineer Intern - IT Supply Chain Management — May 2023 – Aug. 2023

CommScope Inc. — *Suwanee, GA*

- Spearheaded an Augmented-Reality operation assistance service for corporate assembly line operators in Goa, India that enabled designing visual instructions in millimeter-level precision from scratch, increased manufacturing efficiency by **35%**
- Implemented a Model-View-Controller(**MVC**)-based **Python** GUI application with **Object-Oriented Design** for user operations; used **pyodbc** to operate on a relational database designed with **Microsoft SQL Server** with stored procedures to manage user data and process user designs; verified operation completion using **OpenCV**
- **Dockerized** the service and diagnosed container network with **iproute2** tools; automated testing and deployment by implementing **CI/CD** pipeline with **GitLab**; wrote **Bash** scripts to simplify user access; increased testing and development efficiency by **40%**

Research Intern — Aug. 2022 – Present

*Lab for Intelligent Decision and Autonomous Robots, advised by **Professor Ye Zhao*** — *Atlanta, GA*

- Work accepted by **IEEE International Conference on Robotics and Automation (ICRA) 2024** for publication
- Researching on Deep Reinforcement Learning, visual models, environment sensing, and **CNN**/**Transformer**-based policy learning for legged locomotion; created training terrain, simulated behavior of RL algorithms including PPO using **MuJoCo** and **IsaacSim**
- Developed walking control functionalities for Digit, a humanoid robot, using **C++**, **ROS2**, **Linux**, and **Git**
- Created APIs that resolve conflicts in Digit legs control, encapsulated state parameters and transition logic, achieved **20%** increase in development efficiency; work **open-sourced** as part of *https://github.com/GTLIDAR/digit_controller*

Research Intern — Apr. 2022 – Dec. 2022

*Software/Hardware Co-Design Lab at Georgia Tech, advised by **Professor Callie Hao*** — *Atlanta, GA*

- Researched on applying Approximate Computing (AxC) and Quantization-Aware Training (QAT) on Graph Neural Networks (GNN) models; Used **PyTorch**, **PyTorch Geometric**, **Scikit-Learn**, and **NumPy** to explore the Pareto optimality between energy consumption and prediction accuracy for GNNs using OGB datasets
- Reduced **30%** of energy consumption in inference tasks and maintained **99%** of accuracy on GNNs trained with INT8 and INT16 quantization; Work accepted as a poster by **Design Automation Conference (DAC) 2023**

Projects

Library for MapReduce Infrastructure | *C++11, gRPC, OpenMPI, parallel programming* — Nov. 2023

- Implemented MapReduce using C++11 on Linux filesystem, enabled fileshard and managing Worker (mapper and reducer) nodes
- Enforced barrier synchronization using **OpenMPI**, implemented asynchronous Master-Worker communication with **gRPC** calls

5-stage Pipelined RISC-V Processor Design | *SystemVerilog, C++, FGPA, Vivado* — Jan. 2023 – Apr. 2023

- Developed a pipelined processor that consists of Fetch, Decode, Execute, Memory, and Writeback stages and supports Branch Prediction using SystemVerilog based on Tiny RISC-V ISA, increased Instruction Per Cycle by **7%**
- Simulated the design with Xilinx Vivado and deployed on Xilinx ZYNQ **FPGA** to work with High-Level Synthesis IP

RoboNav, a remote-control robot car | https://github.com/mranduril/Robot_Control_System_RoboNav | *RTOS, Flask* — Apr. 2023

- Assembled the car from parts, controlled the wheels, Sonar, and cameras using **ARM Mbed**, **Raspberry Pi**, and **OpenCV**
- Wrote control program on Mbed **RTOS** with C++, enabled remote control and camera access with Flask and JavaScript

Kernel Features Support for xv6 | *C, Linux, QEMU, GDB, Docker* — Sep. 2022 – Nov. 2022

- Created kernel threading library, Round-Robin and Priority schedulers for xv6, a Unix-like operating system
- Built Copy-on-Write forking and lazy zero-page allocation for xv6 with the support of **GDB** and **QEMU**, reduced average costs of memory allocation in fork() from **1000s-10000s** CPU cycles to **100s** CPU cycles
- Developed a file permission system and secured login functionality using SHA256 hashing and AES256 encryption
- Implemented system calls such as fork(), clone(), chmod(), and chown() to provide user space with kernel features

Publication

- F. Wu, Z. Gu, **H. Wu**, A. Wu, and Y. Zhao, "Infer and Adapt: Bipedal Locomotion Reward Learning from Demonstrations via Inverse Reinforcement Learning," in *IEEE International Conference on Robotics and Automation* (accepted for publication), 2024.