

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

Master of Science in Computer Science, Specialized in Systems

Bachelor of Science in Computer Science, Minor in Robotics

Atlanta, GA

Aug. 2024 (Expected) – Dec. 2025 (Expected)

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 file shard 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++, FPGA, 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.