Charlotte Chen

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Education

Columbia University New York, NY

B.S. Computer Engineering *Sept. 2024 – May 2026*

- GPA: 3.86/4.0
- Dean's List
- Tau Beta Pi Honor Society Member

Grinnell College Grinnell, IA

B.A. Computer Science, B.A. Japanese *Aug. 2021 – May 2024*

- GPA: 3.96/4.0 (Major GPA: 4.0/4.0)
- Dean's List

Research Experience

Jetson Nano Power and Performance Analysis Jan. 2025 – Present

Columbia University *New York, NY*

- Set up and configured a Jetson Nano board, explored its integrated SoC and GPU for benchmarking.
- Developed targeted microbenchmarks for CPU and GPU, varying execution unit utilization and memory traffic.
- Investigated the board's power management mechanisms by correlating performance data with power metrics.

SoC Platforms: Convolution Accelerator Oct. 2024 – December 2024

Columbia University *New York, NY*

- Performed design-space exploration for hardware accelerators targeting convolutional layers in DWARF-7 CNNs.
- Integrated the accelerator with an ESP-compatible interface and conducted FPGA-based application testing.
- Analyzed design trade-offs using performance metrics such as effective latency and FPGA resource utilization.

GreenerSKU: Lower Carbon Datacenter Operations Research May. 2024 – Present

University of Minnesota Twin Cities *Minneapolis, MN*

- Developed a simulation model to evaluate the carbon emissions of datacenter operations
- Analyzed the impact of different datacenter configurations on carbon emissions
- Identified and analyzed bugs in the simulation model

Autonomous Driving Research Dec. 2023 – April 2024

North Carolina State University *Raleigh, NC*

- Implemented remote control hardware systems to enhance the evaluation of autonomous driving algorithms
- Wrote advanced algorithms for autonomous driving, focusing on optimizing vehicle behavior, safety, and efficiency
- Analyzed the performance of the algorithms in real-world driving scenarios

Stats2Lab Software Development Research Feb. 2023 – Sept. 2023

Grinnell College *Grinnell, IA*

- Designed and developed three web educational games in Unity using C# (Farmer, Greenhouse, and Coffeetruck) to assist teaching of multivariate statistical models in college courses
- Deployed games to 1000+ students as part of undergraduate statistics curriculum at 5 institutions for testing
- Developed a web application to collect and analyze data from the games

Teaching Experience

Computer Architecture Course Mentor Jan. 2024 – May 2024
Department of Computer Science, Grinnell College *Grinnell, IA*

- Managed weekly prep assignments, check-ins, and general logistics for class
- Held multiple weekly discussions, labs, and homework sessions for students
- Answered questions and provided feedback on assignments

General Chemistry Course Mentor Jan. 2023 – Dec. 2023
Department of Chemistry, Grinnell College *Grinnell, IA*

- Managed weekly prep assignments, check-ins, and general logistics for class
- Held multiple weekly discussions, labs, and homework sessions for students
- Answered questions and provided feedback on assignments

Physics Lab Assistant Sep. 2022 – Sep. 2023
Department of Physics, Grinnell College *Grinnell, IA*

- Tutored students in fundamental physics course sequence (Mechanics, E&M)
- Assisted professor setup lab apparatus

Projects

TPU-like Accelerator Integration in ESP | *SystemVerilog, SoC Design* Jan. 2025 - Present

- Developed testbenches and performed functional verification for a TPU-like processor using ModelSim.
- Integrated the TPU-like accelerator into the ESP, creating a SoC architecture for deep learning inference.
- Analyzed system performance and optimized hardware configurations for power and clock efficiency.

Out-of-Order RISC-V Processor | *SystemVerilog, Computer Architecture* Jan. 2025 - Present

- Designed and implemented an out-of-order RISC-V processor based on P6/R10K architecture, supporting instruction execution out of program order with in-order commit.
- Developed multiple functional units with varying latencies, including a pipelined multiplier.
- Implemented a branch prediction system featuring a branch target buffer (BTB) and bimodal predictor
- Optimized processor performance with superscalar execution, early tag broadcast, and speculation.

Pintos Operating System | *C, Assembly* May 2023 – August 2023

- Implemented user program support, system call interface, priority thread scheduling, and cached file system of the Pintos Operating System
- Optimized the system by priority scheduling, lazy loading, and cache manipulation

NUMC | *C, Python, SIMD* April 2023 – June 2023

- Replicated the NumPy functions of matrix operation in C and generated python package
- Optmized the package by SIMD, OpenMP, loop unrollling, cache manipulation, matrix transposition

Grants

- Grinnell College. Student Research Fund. $4000. *March 2023*
- University of Minnesota Twin Cities. UROP. Collaborated with Senecy Zhang. $2500. *May 2024*