

Madeleine Lee

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Education

Cornell University

GPA: 3.8

- Bachelor of Science: Electrical and Computer Engineering *Expected Graduation: May 2024*
- Dean's List All Semesters | HKN Member | TBP Member | IEEE Executive Board: Social Committee

Relevant Experience

SpaceX FPGA Design and Verification Intern

May 2023- August 2023

- Architected an FPGA module to sample packet data as it passes through the Starlink satellite constellation, allowing systematic identification of drop points and network failures.
- Created a pre-silicon verification testbench in System Verilog. Synthesized and implemented the block in Vivado to perform timing closure before integrating into the full FPGA build. Tested full integration using a Python interface that utilizes DMA to generate stimulus. Wrote documentation in RST.
- Developed a UVM testbench from scratch to test a submodule that is used on all Starlink satellite FPGAs. Worked with the designer to develop a test plan and review coverage. Gained experience with APB protocols and stream interfaces.

Cornell Custom Silicon Systems (C2S2) [[team website](#)]

September 2023- Present

- Student-run project team that leverages open-source chip design tools to architect and tape-out custom ASIC designs.
- Utilizing the wishbone bus architecture to interface our FFT design with the on-chip RISC-V CPU.
- Implementing both a combinational and iterative floating point arithmetic library from scratch.

University of Washington Reynolds Lab Research Assistant [[link to research paper](#)]

June 2022- Present

- Co-authored [Dual-Polarized Electronic Mode Stirring for Improved Backscatter Communication Link Margin in a Reverberant Cavity Animal Cage Environment] for the 2023 IEEE RFID Conference
- Designed and assembled 2 PCBs for 2.4GHz mode stirring antennas.
- Integrated Arduino Mega with Python using the Telemetry library and wrote a function to control antennas with mode stirring algorithm.

Cornell Cup Robotics (Fall '22 Lead)

February 2022- September 2023

Minibot Modular Educational Robot

- Implemented a new motor control circuit to support straight line driving forwards and backwards and allow individual control over speed and direction inputs. The new design standardized wiring for right and left motors.
- Updated old straight-line driving algorithm (PID) for the new system.
- Designed a schematic to run 8 servo motors simultaneously on the Minibot system. The servos allow our Baby Yoda animatronic to move (nod head, wave arms).

Lead Responsibilities

- Provided mentorship and guidance for underclassmen regarding their projects and careers.
- Led demonstrations for visiting corporate engineers, delegated sub-projects to team members, organized meetings.

Computer Architecture- Multi-core Processor [[reports](#)]

- Architected a 4-core processor with a simple ring network, private instruction caches and a shared, banked data cache. Utilized a control data path design methodology across all submodules of the processor.
- Implemented a 5-stage pipelined processor capable of performing a subset of RISC-V instructions, ensuring accurate stalling and bypassing logic to resolve data hazards.
- Decreased memory access latency by implementing a two-way set associative, write-back, write-allocate cache.
- Verified the design by generating over 2000 automated test cases using the pyMTL3 DSL.

Relevant Coursework

Computer Architecture | Digital Logic and Computer Organization | Microcontrollers (Fall '23) | Embedded Systems | Embedded Operating Systems (Fall '23) | Circuits | Electromagnetic Fields and Waves | Signals and Systems | O.O.P. and Data Structures | Data Science | Programming Abstractions | Foundations of Robotics (Fall '23)

Relevant Skills

RTL Design (SystemVerilog), RTL Verification, UVM, PCB Design (Altium), C, C++, Python, Java, Git, Linux, Soldering