Anna Murray

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Education

Northwestern University June 2026
Bachelor of Science (B.S.) Computer Engineering Evanston, IL

Relevant Coursework: Operating Systems, Microcontroller System Design, Computer Architecture, Data Structures and Algorithms, Networking, Advanced Digital Design, Computer Systems, Electrical System Design

Skills

Languages: C, C++, Python, SystemVerilog, Verilog, MATLAB, x86 Assembly, ARM Assembly, VHDL, Java
Tools: Git, Linux, Altium Designer, Unix, Arduino, GDB, EAGLE, Cadence, Modelsim, OpenLane, Xilinx Vivado
Protocols and Standards: CAN, SPI, PID, UART, I2C, TCP/IP, UDP, Bluetooth

Experience

Drivetrain Electronics Subteam Lead June 2024 – Present
Northwestern University Formula Racing Evanston, IL

- Led a team of 5 engineers to design, manufacture, and integrate a fully custom EV drivetrain system for a competitive Formula SAE Electric racecar
- Implemented automatic traction control, **PID**, and regenerative braking to optimize motor torque output by examining incoming sensor data via **CAN** bus and processing data on an **ESP32 Microcontroller**
- Designed and assembled optimized multi-layer PCBs for the car's 30kW three-phase power inverter and electronic throttle & brake control boards using **Altium Designer**

Undergraduate Teaching Assistant March 2023 – January 2024
Northwestern University Department of Computer Science Evanston, IL

- Assisted 290+ undergraduate students with homework and programming projects covering Python and object-oriented programming in COMP_SCI 150: Fundamentals of Computer Programming 1.5
- Coordinated with professors, graduate TAs, and other undergraduate TAs to identify and address concepts where students need reinforcement

Projects

Electronic Throttle & Brake Control Board | *C++, EAGLE, CAN, SPI* November 2023 – May 2024

- Designed, assembled, and integrated a rules-compliant Acceleration Pedal Position Sensor, Brake System Encoder, and Brake System Plausibility Device for a competitive FSAE EV Formula One-style motorsport car
- Analyzed throttle signals from analog Hall-effect sensors in real time using ADCs and **SPI** to efficiently perform calculations and implausibility checks on a **Teensy 4.0 microcontroller** using **C++**
- Engineered a multi-layer custom PCB developed in **EAGLE**
- Communicated processed throttle and brake data over **CAN** with accuracy up to 99% for 12 bits

Signal Processing Accelerator ASIC | *SystemVerilog, ModelSim, OpenLane* November 2023 – May 2024

- Developed a 16-bit **digital signal processing** algorithm accelerator ASIC from RTL design to tape-out with 99.9% accuracy up to 12 bits and 20%+ increase in FFT & IFFT speed compared to numpy's FFT & IFFT algorithms
- Optimized FFT, IFFT, and FIR algorithms in RTL by converting from **C** to **SystemVerilog** and implementing pipelining
- Awarded "Most Technical" award by Northwestern IEEE sponsors at Northwestern IEEE's 2024 Spring Showcase

Embedded Overhead Harness Scale | *C++, ESP32, Arduino, Python, Matplotlib, Git* March 2023 – June 2023

- Engineered an embedded overhead scale that displayed weight data and changes in real time on client's laptop via numerical, tabular, and graphical interfaces using **Matplotlib** and **ESP32 Bluetooth** communication protocol
- Developed a sophisticated mathematical model to efficiently translate small changes in voltage to body weight offloaded using **C++**
- Improved accuracy over previous overhead scale designs by 15%, resulting in an accuracy within ±5 pounds