Mari Braun

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Education

University of Massachusetts - Amherst Aug. 2023 – May 2027
Bachelor of Electrical Engineering, Minor in Mathematics and Chemistry *GPA: 3.80*

Projects

ESP-32 Cellphone | *C++, Antennas, LTE, RF, Transceivers, Amplifiers, SPI, Embedded Systems* Jan 2025
- Creating a phone based on the ESP32 and Simcom 7000 series chips to emulate the Motorolla Razr V3
- Gained experience scaling electronics down, and optimizing for power efficiency
- Using logic analyzers to reverse engineer parts of the original Razr such as battery charging, as well as display interfacing. Plan to use FPGA's to interface with these components.

Auto Hardware Sorter | *C++, SPI, Motor Drivers, Encoders, Linux, Machine Learning* November 2024
- Worked with 3 friends to design a M2-M8 automatic hardware sorter.
- Developed a communication interface for an ESP-32 to autonomously control the hardware sorter based on the output of a trained convolutional neural network developed by a teammate
- Controlled and encoded conveyor belts, hardware bins, and vibration motors with motor controllers and PWM
- Used Fusion360 to design CAD for 3D printed pulleys, belts, and camera mounts

Magnetic Core Memory | *Current Amplifiers, Small Signal Electronics, KiCad* March 2024 – Current
- Created a control logic board in order to easily interface with 256 bytes of memory with a custom 8-bit-CPU
- Designed and ordered a current sense circuit to detect magnetization changes in ferrite cores.
- Tested and determined hysteresis curve for magnetic cores using amplifiers and oscilloscopes.

8-Bit-CPU | *Digital Logic, Instruction Set Architecture, Custom Assembly* September 2022 – October 2023
- Created an improved version of Ben Eater's CPU that has 256 bytes of ram, 2 data registers running at 1000 Hz
- Used an arduino-based EEPROM programmer to implement a custom instruction set.
- Multiplexed 7-segment displays in order to comvert the binary into readable decimal numbers
- Wrote Assembly programs for multiplying, dividing, and computing fibonnaci numbers

Discrete Nixie Clock | *KiCad, Crystal Clocks, Switch Mode Power Supplies* Oct 2024 – Nov 2024
- Developed and ordered a 12 to 180 volt boost converter with feedback using the MC34063 in KiCad
- Used a quartz crystal attached to T-Flip-Flops to create accurate one second pulses.
- Created high voltage nixie tube drivers based on the output of the flip flops.

Experience

Electronics Specialist Jan 2024 – Present
Umass Amherst All Campus Makerspace *Amherst, MA*
- Mentored electronics for Senior Design Projects, Hackathon Projects, and many other personal electronics
- Enhanced communication skills, workplace flexibility, project management, and problem solving
- Developed system for organizing and keeping track of electrical components
- Set up soldering and ventilation systems, as well as LED signs running WLED

Game Development and Web Design Counselor June 2024 – Aug 2024
Summer Discover *Framingham, MA*
- Taught middle-school aged students how to use Unity, Scratch, and basic web development
- Gained confidence explaining complicated concepts in a simple and understandable way

FRC Captain Sep 2022 – May 2023
Holliston Robopanthers *Holliston, MA*
- Programmed robot controller using WPI-lib, and designed a system for grabbing and placing cargo
- Machined robot parts using lathes, CNC machines, drill presses,and 3d printers
- Created a positive and educational environment for new members learning the ropes of robotics

Technical Skills

Programs: KiCad, LT-Spice, Fusion 360, Arduino, CircuitLab, Logisim, Excel
Tools: Oscilloscopes, Function Generators, Soldering, Multimeters, IoT, Pytorch, Embeded Systems, Webkit
Languages: Java, C#, Javascript, Matlab, C++, GLSL, Python, HTML/CSS, Assembly, R