Mackenzie Goodwin

+1 (321) 367 8901 | @ mackenziejgoodwin@outlook.com | LinkedIn | GitHub | My Website | Palo Alto, CA

Skills

Languages: Python, C, C++, System Verilog, Verilog, Java, Javascript, Solidity

Tools: Verilator, Cocotb, Altium, Vivado, Cadence, Ansys HFSS, ModelSim

Experience: Network Protocols, RTL Design, Highspeed Design, Full Stack, Analog & Digital Design, PCB Design, Web Design

Experience

Tesla Inc. — Palo Alto, CA
DOJO Senior Silicon Design Engineer — *Feb 2024 – Present*
- Innovated and developed the proprietary Tesla Transport Protocol (TTP) over Layer 3 congestion-aware protocol enabling low-latency, high-throughput communication across DOJO fabric
- Presented contributions to TTP at Hot Chips 2024; received patent recognition for protocol and silicon integration
- Brought design of TTP to tape out ready in next generation DOJO Z2
- Designing TTP on DOJO D3 silicon
- Led design of custom high-density compute cluster integrating NICs to enable TTP-based communication
- Collaborated across silicon, networking, and systems to optimize fabric-level throughput and scalability
- Designed and implemented a custom NIC with PCIe, DDR, and 100G QSFP for TTP communication

Tesla Inc. — Palo Alto, CA
DOJO Hardware Engineering — *Jul 2022 – Feb 2024*
- Worked on PCB hardware and silicon design for TTP fabric
- Designed and integrated a custom NIC with PCIe, DDR, and 100G QSFP for TTP communication
- Optimized production line throughput via automation and end-of-line testers
- Authored RTL, C++ drivers, and Node.js backend for hardware tracking and system diagnostics
- Wrote RTL for I2C-to-AXI translation enabling microcontroller access to internal buses
- Built automated silicon provisioning/test framework and debugged 50Gb/s SERDES & 100G QSFP interfaces

Tesla Inc. — Palo Alto, CA
DOJO Hardware Intern — *Aug 2021 – Dec 2021*
- Tested high-speed interface cards for mesh network and fabric communication containing 100G QSFP and high speed SERDES interfaces achieving TB/s throughput, alongside high-density power supply units
- Engineered a super capacitor hot swap controller, enabling seamless hardware insertion into a live cabinet, thus promoting operational convenience and safety
- Engineered next generation DOJO cabinet controller with wide array of IOs and infastructure controllers
- Brought up Tesla's first generated DOJO cabinet with compute nodes and power supply units
- Effectively tested and integrated a large, complex system comprising intricate harnessing, control systems, and high-power delivery, ensuring overall system coherence and performance

Tesla Inc. — Palo Alto, CA
Autopilot Hardware Intern — *Jan 2021 – May 2021*
- Built Python test suites for switch, GPS, and VRM bring-up to streamline validation workflows
- Debugged Autopilot board failures in thermally stressed environments
- Performed TDR and eye diagram analysis for SGMII and 1000Base-T1 interfaces
- Validated buck converter transient/load stability

University of Waterloo — Waterloo, ON, Canada
Undergraduate Research Assistant — *Apr 2020 – Aug 2020*
- Developed 60GHz mmWave radar for non-contact hospital patient monitoring
- Created DSP pipeline using wavelets/autocorrelation to detect breathing rates at 10m range
- Built Python/C++ client-server system for real-time offloaded processing

Kazoo Technology   Hong Kong, HK
Electronics Designer Intern   *Aug 2019 − Apr 2020*
- Reversed engineered stylus touch hardware and validated via simulation and prototype
- Designed analog amplifiers and touch spoofing systems with 200MSPS ADC on FPGA

AR Modular RF   Seattle, WA
RF Hardware Engineering Intern   *Jan 2019 − Apr 2019*
- Built LabView + Python-based automated RF test infrastructure, improving test speed and repeatability
- Automated MAC management and firmware flashing system for IP-enabled RF products
- Performed RF spec analysis and documented technical content for marketing

Evertz Microsystems   Burlington, ON, Canada
Systems Engineering Intern   *May 2018 − Aug 2018*
- Researched impedance/phase matching for 25G QSFP lanes to improve signal integrity
- Captured RGMII, SGMII, and 1000BTX schematics with optimized magnetics and termination
- Developed firmware for detecting encrypted video signals

Evertz Microsystems   Burlington, ON, Canada
Systems Engineering Intern   *Sep 2017 − Dec 2017*
- Created FPGA firmware for timestamped 10Gb/s packet capture and replay
- Designed DDR3 buffer system with DMA for Wireshark-compatible frame dumping
- Debugged PCB short circuits and engineered active fuse systems

Dozr   Kitchener, ON, Canada
Fullstack Software Engineer   *Jan 2017 − Apr 2017*
- Developed frontend React components and internal tooling using advanced state management
- Built distributed Node.js/Python crawler with intelligent throttling and parallelism

PROJECTS

All projects available at mackenzieg.tech/projects

Microplastic Detector | *Research Project (2020 – 2021)*
- Designed and built a microwave cavity resonator system to detect microplastic concentrations in water samples
- Developed signal processing algorithms to analyze resonant frequency shifts and S11 magnitude changes
- Achieved reliable detection of microplastic concentrations from 300-900 ppm with clear correlation in resonant magnitude

EDUCATION

University of Waterloo   Waterloo, Ontario, Canada
Bachelor of Science in Electrical Engineering; GPA: 3.58/4.00   *Sep 2016 − June 2022*