

Mackenzie Goodwin

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EDUCATION

University of Waterloo

Bachelor of Science in Electrical Engineering; GPA: 3.58/4.00

Waterloo, Ontario, Canada

Sep 2016 – June 2022

SKILLS

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

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

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

EXPERIENCE

Tesla Inc.

Senior Silicon Design Engineer

Palo Alto, CA

Feb 2024 – Present

- Innovated and developed the proprietary Tesla Transport Protocol (TTP) over Layer 3—a 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
- 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

Tesla Inc.

DOJO Hardware Engineering

Palo Alto, CA

Jul 2022 – Feb 2024

- 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.

DOJO Hardware Intern

Palo Alto, CA

Aug 2021 – Dec 2021

- Tested 100G QSFP and SERDES-based interface cards for DOJO mesh fabric and high-density power systems
- Designed supercapacitor hot-swap controller enabling safe live insertion
- Brought up Tesla's first DOJO compute cabinet and verified cabinet-wide integration

Tesla Inc.

Autopilot Hardware Intern

Palo Alto, CA

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

Undergraduate Research Assistant

Waterloo, ON, Canada

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

Electronics Designer Intern

Hong Kong, HK

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

RF Hardware Engineering Intern

Seattle, WA

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

mmWave Radar Vital Sign Detection | *Full-Time Research (2020 – 2021)*

- Developed a 60GHz mmWave radar system to detect breathing rates remotely, aiding nurses with highly infectious patients.
- Designed a signal processing algorithm in MATLAB using wavelet transforms and auto-correlation to accurately detect breathing rates at distances up to 10 meters.
- Implemented a real-time client-server architecture in Python and C++ to offload computation and streamline system responsiveness.