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Mackenzie Goodwin

Hardware / Software Engineering

Website: mackenzieg.tech
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Highly driven and passionate professional seeking opportunities to work on cutting-edge, innovative devices.
Committed to pushing technological boundaries and contributing to groundbreaking advancements in the industry.

Technical Experience

Sr. Hardware Engineer **07/2022 — Current**
Tesla *California*

- Enhanced the design of next-generation silicon for advanced machine learning models used in self-driving vehicles, focusing on performance and efficiency improvements
- Led the design and integration of network interface cards, including PCB layout, RTL development, and software drivers, to support the Tesla Transport Protocol using FPGA and silicon for compute clusters
- Designed and implemented manufacturing lines from scratch for high-speed communication systems, including electrical and optical FPGA cards, power supplies, and server racks, establishing a foundation for efficient and reliable production

Hardware Engineering Intern **08/2021 — 12/2021**
Tesla *California*

- Designed and tested high speed interface cards pushing data to mesh network at TB/s and high density power supply units
- Designed and implemented FPGA RTL communication peripherals such as I2C to enable external command and control architecture from on board Microcontroller
- Implemented test fixtures and testing suites to exercise components from production line to ensure long term reliability

Autopilot Hardware Engineering Intern **01/2021 — 04/2021**
Tesla *California*

- Wrote hardware validation testing suites for the team including Ethernet Switch, GPS, VRM bringup in Python to reduce repetitive tasks and build software infrastructure
- Discovered, root caused and implemented a solution to reliability issues on AutoPilot board in temperature varying environments
- Performed time-domain reflectometry on SGMII and 1000Base-T1 signal paths to verify signal integrity and performed eye-diagram analysis for intersymbol distortion
- Validated multi-phase buck converter load transient step response and open-loop phase response; meeting requirements

Electronics Designer and Innovator Intern **08/2019 — 04/2020**
Kazoo Technology *Hong Kong*

- Reversed engineered capacitive touch screen stylus hardware to develope custom communication protocols
- Design discrete analog amplifiers and digitally controlled filters for low noise and power systems
- Designed 200MSP/s ADC with FPGA dev-board to emulate different active stylus protocols

Systems Engineering Intern **08/2017 — 04/2018**
Evertz Microsystems *Toronto*

- Developed FPGA firmware for capturing and replaying 10GB/s fibre optic IP packets with realtime hardware timestamping
- Improved SDRAM data packing density by 50% using intelligent circular buffering and memory pre-caching
- Debugged production volume issues on power supplies failing and designed mitigations

Projects

Fulltime Research for mmWave Radar Vital Sign Detection **2020 — 2021**

- Developed 60GHz mmWave Radar system for detecting breathing rate from a distance to aid nurses with highly infectious patients
- Designed algorithm using Matlab with wavelet transformation and auto-correlation to detect breath rate at up to 10 meters
- Implemented client-server architecture in Python and C++ to offload processing in realtime

Skills

Languages	Python, C, C++, Verilog, TCL, Java, Javascript, Solidity
Tools	Altium, Vivado, Cadence, Ansys HFSS, ModelSim
Tools	Vivado, Cadence, Altium, Modelsim
Specialties	Highspeed Design, Full Stack, Analog & Digital Design, RF Design, RTL Design