

Fischer J. Moseley

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Education

Massachusetts Institute of Technology

Cambridge, MA

BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING AND PHYSICS - GPA: 4.6/5.0

Aug 2018 - May 2022

- **EE Coursework:** Graduate Power Electronics, Graduate Feedback and Control System Design, Underactuated Robotics, Robotic Manipulation, Mobile Autonomous Systems Lab, Nanofabrication Project Lab, FPGA Project Lab, Power Electronics Lab, Signal Processing, Electromagnetics, Circuits and Electronics
- **Physics Coursework:** Quantum Physics I & II, Quantum Computation, Quantum Measurement and Noise, Intro Fusion Reactor Design, Advanced Electricity and Magnetism, Statistical Mechanics, Classical Mechanics I & II

Massachusetts Institute of Technology

Cambridge, MA

MASTER'S DEGREE IN ELECTRICAL ENGINEERING

Aug 2022 - May 2023 (expected)

- Completely rewriting the content of MIT's *Digital Design* Lab Course, focusing on modern applications of digital hardware in Image Processing, Machine Learning, Signal Processing, and Financial applications. Done under the supervision of Joe Steinmeyer.

Experience

Kongsberg Maritime

Oslo, Norway

MACHINE LEARNING ENGINEER

June 2022 - Aug 2022

- Created ML models to predict the motion of ocean vessels, approximating lengthy physics-based simulation output.
- Wrote custom models in PyTorch Lightning, and compared them against state-of-the-art prediction models.

MIT Engineering Quantum Systems Laboratory

Cambridge, MA

RESEARCHER

Sept 2021 - Apr 2022

- Developed ML-based classifiers to improve readout fidelity on superconducting qubits.
- Demonstrated improvements with multi-layer perceptron networks over optimal linear filters on simulated qubit-resonator systems.
- Implemented classifiers in Tensorflow, but transcompiled to HLS that synthesizes to RTL for FPGA-based digitizers. Resulting classifier runs in nearly real-time, allowing for more accurate measurement at the same bandwidth.

MIT Applied Mathematics Laboratory

Cambridge, MA

EXPERIMENTAL PHYSICIST

Aug 2018 - Aug 2021

- Designed a network of nonlinear LRC oscillators to mimic atomic interactions using models from condensed matter physics, producing behavior similar to a quantum system of particles in collaboration with the University of Würzburg.
- Performed LTSpice simulations to verify nonlinear circuit behavior, and constructed an experimental setup to verify simulations.
- Joint first author of "Active Topoelectrical Circuits" published in *PNAS* and available on arXiv.

Electric Era Technologies

Seattle, WA

ELECTRICAL ENGINEER

Jun 2021 - Aug 2021

- Wrote time-domain simulations for a 625kW lithium-ion pack for grid-tied energy storage, driving thermal system design.
- Designed fluid cooling system controller in Altium, complying with relevant UL, IEC, and NEC standards.

MIT Space Telecommunications, Astronomy and Radiation Laboratory

Cambridge, MA

SPACECRAFT ENGINEER

Jun 2020 - Apr 2021

- Worked on a team of 20 to build a 3U CubeSat to increase the accuracy of hurricane predictions.
- Fully redesigned flight computer hardware with two fully-redundant Raspberry Pi CM3+ modules managed by a STM32 Cortex-M4.
- Wrote flight software in C++ for power management, attitude control, data acquisition, and ion engine control.
- Scheduled launch to ISS and deployment to LEO in late 2021.

CSU Online

Fort Collins, CO

INTEGRATION ENGINEER

Mar 2020 - Jul 2020

- Rewrote a proprietary Salesforce database connector in Azure Functions and Logic Apps, decreasing operating costs by a factor of 50.
- Created a CI/CD pipeline for automated build and deployment of a Java-based REST API to a serverless Kubernetes cluster.

SparkFun Electronics

Boulder, CO

EXPERIMENTAL PRODUCT ENGINEER

Jun 2019 - Aug 2019

- Created a radio link for relaying ionospheric correction data between GPS modules, enabling 1cm positioning accuracy.
- Also released three new fully open-source products for SparkFun's Qwiic product line, with over 1,000 sold.
- Performed all circuit design, PCB layout, PnP assembly, firmware development, and quality control for each.

Projects

MIT Motorsports

Cambridge, MA

ELECTRICAL TEAM LEAD

Mar 2020 - Jun 2021

- Worked on a team of 40 and lead a team of 10 to develop an electric Formula One racecar for competition in summer 2021.
- Developed a custom 60kW three-phase inverter, implementing field oriented control and nonlinear power limiting.
- Redesigned custom motor dynamometer for validation and testing of powertrain components.

ELECTRICAL ENGINEER

Aug 2018 - Jul 2019

- Designed and fabricated the hardware for a charge controller for a 400V battery with Altium, moving functionality from external proprietary controllers to internal microcontrollers while maintaining compatibility across multiple vehicle generations.
- Created custom battery testing platform for performance evaluation and battery protection.

Network-Controllable RGB Laser Projector

Cambridge, MA

FINAL PROJECT - FPGA LABORATORY COURSE

Dec 2020

- Worked with a partner to design a FPGA-based RGB laser projector, with real-time image streaming via UDP over the open internet.
- Implemented a custom networking stack from scratch, going from a L1 RMII Ethernet PHY to full L4 UDP support, including support for MAC, ARP, ICMP, and IP.
- Packet deencapsulation is faster than the ethernet interframe gap, allowing for speeds in excess of 100Mbit/sec.
- Designed and fabricated a custom RGB laser driver, for full-color output and mirror galvanometer position control.

Self-Balancing One-Wheeled Hoverboard

Cambridge, MA

INDIVIDUAL FINAL PROJECT - POWER ELECTRONICS LABORATORY COURSE

Dec 2019

- Created a OneWheel-inspired longboard that self-balances on a pair of permanent magnet brushless hub motors in the center of a self-built welded steel tube frame, enabling the rider to control the board by leaning forwards and backwards.
- Designed and fabricated a custom dual-output FPGA-based motor controller from discrete parts, and implemented a PID algorithm for self-balancing on a ARM Cortex M4. Implemented block commutation on a sensed configuration.
- Went from discrete components and steel stock to working prototype in four weeks.

GPS Disciplined Oscillator

Windsor, CO

PERSONAL PROJECT

Aug 2016 - Mar 2017

- Combined a high-stability crystal oscillator with a GPS receiver to create a self-calibrating frequency reference.
- Re-engineered the system architecture for maximum price-to-performance ratio, reducing cost by 30% over similar commercial units.
- Maintained accuracy of one part per billion, or about three seconds out of every hundred years.

Teaching

2022	Lecturer , 6.SXXX - IAP PCB Design Course (anticipated)	MIT
2022	Teaching Assistant , 6.111 - Digital Design Lab Course	MIT
2022	Teaching Assistant , 6.146 - Mobile Autonomous Systems Laboratory	MIT
2022	Lab Assistant , 6.111 - Digital Design Lab Course	MIT
2020	Lab Assistant , 6.002 - Circuits and Electronics	MIT
2019	Lab Assistant , 6.002 - Circuits and Electronics	MIT
2018	Lecturer , Intro Electronics Lab	CEFC High School

Skills

Software	Altium, Eagle, LTSpice, Vivado, MATLAB, OpenCV, Tensorflow, QuTip, Drake, GCC/GDB, Docker, Kubernetes, Fusion 360
Languages	English (native), German (basic), C/C++, Python, SystemVerilog, LaTeX