

Hamza Dugmag *Electrical and Computer Engineering Student*

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SKILLS

Electrical: Altium Designer/KiCad, LTspice/Multisim, PLECS, Ham Radio (Certified), Soldering, Oscilloscope, VNA, Fusion 360, 3D Printing
Computer: Python, SystemVerilog, VCS/Quarta, Quartus Prime, MATLAB/Simulink, C/C++, Assembly, Arduino/RPi, ROS, Git/P4, Docker

PROFESSIONAL EXPERIENCE

Power Electronics Research Intern, U of T Power Conversion and Systems Analysis Laboratory May 2024 – present
Toronto, ON, Canada

- Developed LTspice simulations of high-speed gate drivers for emerging 1200V eGaN HEMTs to guide the selection of components (diodes, filters, etc.) and parameters (dead time, fsw, etc.).
- Created the PCB schematic, BOM, library components, layer stack, design rules, layout, and routing of a half-bridge containing two GaN devices, bootstrapped level-shift drive circuits, and DC link capacitors using Altium Designer, minimizing trace inductance, Miller plateau, and EMI.
- Assembled (SMT soldering) and validated the board by programming a microcontroller with PLECS and C to gate the switches using SPWM while analyzing waveforms from an oscilloscope.

RTL Design Engineering Intern, Intel Corporation — Programmable Solutions Group May 2023 – Apr 2024
San Jose, CA, United States

- Explored microarchitecture and interconnect (AMBA AXI4) logic design, timing, benchmarking, simulation, and verification of Nios V, the RISC-V based embedded processor IP family for FPGAs.
- Optimized instruction pipelining via register balancing, control-based logic reuse, and FPGA primitive instantiation, improving area utilization by 20%, maximum frequency by 20%, and instructions per cycle by 5%.
- Redesigned the hardware for RISC-V based external debug support and validated it using gdb, OpenOCD, and QuestaSim, improving area utilization by 10% and latency by a factor of 6.
- Defined a custom SystemVerilog style guide to improve code readability, authored numerous functional specifications, and enhanced customer-facing documentation.

Field Robotics Research Intern, UTIAS Autonomous Space Robotics Laboratory May 2022 – Aug 2022
Mississauga, ON, Canada

- Planned, conducted, and documented field tests at various lakes to validate mapping, localization, and stochastic navigation of a retrofitted Clearpath Heron unmanned surface vehicle.
- Generated satellite-informed water masks of Canadian lakes using GISs and created a Python-based simulation platform for evaluating different route-planning algorithms over 2217 graphs.
- Developed a graphical user interface using ROS and ReactJS to track the robot and visualize its navigation policy in real time over a wireless network.
- Y. Huang, H. Dugmag, T.D. Barfoot, F. Shkurti, "Stochastic Planning for ASV Navigation Using Satellite Images", 2023 IEEE International Conference on Robotics and Automation (ICRA). ☑

Engineering Academic Review Mentor, U of T Faculty of Applied Science and Engineering Aug 2021 – Apr 2022
Toronto, ON, Canada

- Hosted drop-in sessions to advise and support first-year Engineering Science students with their academic, professional, and personal development goals as they adjust to university.

Machine Learning Research Intern, U of T Forcolab Group May 2021 – Aug 2021
Toronto, ON, Canada

- Conducted a literature review analyzing the potential of using collaborative Stack Overflow posts to organize knowledge for improved searching and learning experiences.
- Investigated various code clone detection models to compare educational code snippets to programming language documentation.
- Optimized parameters for hierarchical density-based clustering of Stack Overflow posts using Python (NumPy, Pandas, PyPlot) and Docker, increasing precision by 11%.

EDUCATION

B.A.Sc. in Engineering Science (Major in Electrical and Computer Engineering, PEY Co-op), Certificate in Engineering Business, University of Toronto (St. George) Sep 2020 – May 2025
Toronto, ON, Canada

- 3.96/4.00 cGPA, 92% average, 6/6 Dean's Honours List, 11 merit-based awards totaling C\$75000+.
- Courses: Power Electronics, Analog and Digital Electronics, Microwave Circuits, Electric Drives, VLSI Technology, Radio and Microwave Wireless Systems, Control Theory, Capstone Project
- Thesis: Designing High Power Density GaN-Based Variable Frequency Drives for PCB Stator Motors

PROJECTS

Liquid Rocket Chief Engineer, University of Toronto Aerospace Team — Rocketry Division Jun 2022 – Sep 2023

- Coordinated the design, analysis, fabrication, and testing of a high-altitude liquid-propellant rocket with 19.25 kNs of total impulse.
- Created the design requirements, concept of operations, bills of materials, and mass budget for avionics, propulsion, aerodynamics, airframe, recovery, and GSE subsystems.

- Organized a preliminary design review with advisors and communicated the project to 50+ members at onboarding sessions and team meetings.

Avionics Subsystem Lead, University of Toronto Aerospace Team — Rocketry Division

Jun 2021 – May 2022

- Managed a team to design and integrate radio transceivers, GPS, Li-ion batteries, buck/boost converters, microcontrollers, servo motors, thermocouples, load cells, pressure transducers, and DACs in the flight and ground systems of an award-winning hybrid-propellant rocket. ☑
- Collaborated with propulsion and airframe systems on *SolidWorks* to ensure avionics hardware meets mechanical requirements (sizes, shapes, clearances, layout, ports, harnesses, mounts, etc.).
- Designed surge-protected relay circuits to control DC motors with a *Raspberry Pi* over a wireless network from a custom graphical user interface written in *C++*, increasing power rating by 20x.
- Debugged a strain gauge amplifier board using an oscilloscope (*I2C* trigger), *Arduino*, bench power supply, and digital multimeter.

Electric Guitar Pedals

Dec 2022 – Jan 2023

- Designed a guitar distortion pedal based on a common-emitter NPN Darlington pair.
- Built a guitar tremolo pedal with true bypass switching using a phase shift oscillator.
- Soldered through-hole electronics and packaged the perfboards in custom 3D-printed enclosures created using *Fusion 360*.

Adjustable Power Supply

Jul 2022 – Aug 2022

- Designed, breadboarded, soldered, and tested an adjustable linear power supply based on the LM317 using *KiCad* and a digital multimeter.
- Created a voltage indicator circuit using LEDs, a Schmitt-triggered LM339, and a resistor ladder.
- Incorporated safety features including fuses, Schottky diodes, and inrush current limiters.

AWARDS

(C\$10000) Undergraduate Student Research Award,

Apr 2024

Natural Sciences and Engineering Research Council of Canada

Awarded on the basis of academic merit and research potential.

(C\$4984) Christina and Logan Martin Scholarship in Engineering,

Aug 2023

U of T Faculty of Applied Science and Engineering

Awarded on the basis of academic merit.

(C\$8942) Kenneth Carless Smith Award in Engineering Science,

Aug 2023

U of T Faculty of Applied Science and Engineering

Awarded by the chair on the basis of interest and aptitude in the area of electronics.

(C\$2676) Peter Sands Award in Engineering Science,

Aug 2022

U of T Faculty of Applied Science and Engineering

Awarded by the chair on the basis of academic merit, qualities of character, leadership, and commitment to the engineering profession.

(C\$9000) Undergraduate Student Research Award,

Mar 2022

Natural Sciences and Engineering Research Council of Canada

Awarded on the basis of academic merit and research potential.

(C\$27000) Fessenden-Trott Scholarship, Universities Canada

Sep 2021

Selected among nominees across Ontario universities on the basis of academic merit, leadership, extracurricular involvement, and reference letters.

(C\$5000) Dean's Summer Undergraduate Research Pivot Award,

Sep 2021

U of T Faculty of Applied Science and Engineering

Participated in the *Undergraduate Summer Research Program*.

(C\$2000) May Court Education Award, May Court Club of Oakville

Jun 2020

Awarded on the basis of extracurricular involvement and reference letter.

(C\$2000) Rotary Education Award, Rotary Club of Oakville

Jun 2020

Awarded on the basis of academic merit and community service.

(C\$2000) Faculty of Applied Science and Engineering Award,

May 2020

U of T Faculty of Applied Science and Engineering

Awarded on the basis of academic merit.

(C\$5000) Faculty of Applied Science and Engineering Admission Scholarship,

May 2020

U of T Faculty of Applied Science and Engineering

Awarded on the basis of academic merit and extracurricular involvement.