Adyn Miles

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EDUCATION

University of Toronto   **(September 2017 - April 2022 Expected)**

- B.A.Sc in Engineering Science specializing in Aerospace Engineering (Third Year)   3.82/4.00 GPA
- Dean's Honour List (average above 80%): Fall 2017, Winter 2018, Fall 2018, Fall 2019, Winter 2020.

PUBLICATIONS

- A. Miles, M. S. Hosseini, S. Tang, Z. Wang, S. Damaskinos, K. N. Plataniotis. "Transferability of Deep Learning Models for Focus Quality Assessment in Digital Pathology," 2021.
- Z. Wang, M. S. Hosseini, A. Miles, K. N. Plataniotis, and Z. Wang, "FocusliteNN: High efficiency focus quality assessment for digital pathology," in International Conference on Medical Image Computing and Computer-Assisted Intervention, pp. 403–413, Springer, 2020.
- D. Vogel, A. Mukkala, K. Ren, L. Lan, Y. Da Li, E. van Velzen, B. Almeida, C. Chanen, and A. Miles, "HERON: Demonstrating a Novel Biological Platform for Small Satellite Missions," 2021.
- C. Chanen, A. Nair, A. Miles, A. Cognigni, B. Nero, B. Almeida, B. Richards, C. Rodriguez, C. Guo, D. Maranto, et al., "Inspiring the next generation: Challenges and strategies for onboarding and retention in an undergraduate cubesat design team," 2021

INDUSTRY AND RESEARCH EXPERIENCE

Undergraduate Thesis   **(September 2021-Present)**
Supervisor: Professor Christopher Damaren
Authoring a thesis that investigates the controllability of hybrid magnetic and impulsive thrust for Earth-observing spacecraft.

- Modelling and developing a control system in MATLAB for this spacecraft.
- Directing my own research project by performing a literature review, generating a proposal, and scheduling regular meetings with supervisor.

Systems Lead - Space Systems Design Capstone   **(September 2021-Present)**
Performing Operations, Systems, Mechanical, Electrical, and Controls design for a system of pods designed to mine water from an asteroid.

- Handled communications with MDA for advice on the project as well as for negotiation of mission requirements.
- Developed system and subsystem requirements for the mission, and identified key mission trade studies and design drivers.
- Performed full heat transfer analysis and link budget analysis for the system.

University of Toronto Aerospace Team - Nanosatellite Launch   **(September 2018-Present)**
Payload Systems Lead on a large team of aerospace students and enthusiasts. Currently in the early design phase of a small satellite project carrying a hyperspectral imaging platform which seeks to image atmospheric greenhouse gas emissions for climate change research. This team has another satellite with a microbiology payload scheduled for launch in spring 2022 that I have also contributed to extensively as a systems engineer.

- Leading a team of 20 students to build the optical track and the imaging electronics, as well as defining a feasible and impactful research mission for the satellite.

- Performed detailed requirements formulation and tradeoff analyses on a system wide level to ensure feasibility of the optical payload across the entire design.
- Designing the ground station and operations procedure for a microbiology satellite using GNURadio and Python.
- Planned, designed and performed 10+ major tests in collaboration with other team subsystems to verify the structural, thermal, and electrical capabilities of the satellite, including thermal bakeout, thermal vacuum chamber, and vibrational testing.
- Used SolidWorks CAD software to create mechanical interface drawings for some of the electrical components housed in the payload bay, and designed an interface plate that can be used to mate the satellite to the conductive plate used in the MDA thermal vacuum chamber testing facility.
- Developed a C++ library for testing humidity sensors, then used this library to verify with a Raspberry Pi that the satellite's payload bay could achieve 100% relative humidity, a condition crucial for the biological experiment it housed.
- Verified the electrical performance of the power distribution board under significant thermal stress using thermal camera images, then created an average heat profile of the board using MATLAB to determine the hotspots.
- Produced formal test procedure documentation in collaboration with MDA Corporation in order to organize future tests in their thermal vacuum chamber, and to create a strong knowledge base for future launches.

Research Assistant - Digital Pathology Multimedia Lab (May 2019-Present)
Employer: University of Toronto

Authoring a scientific journal entry and co-authored a conference entry in computer vision for focus quality assessment applications in digital pathology.

- Improved the speed and usability of an industry-bound MATLAB program that is now used at Huron Digital Pathology in Waterloo, Ontario. The software produces a focus quality heatmap of a scan of biological tissue to facilitate the production of biopsy reports.
- Built a Python and PyTorch implementation of this program, which added the feature of using neural networks to create the heatmap.
- Built a public database of over 1000 whole slide images that can be used for testing data-driven models.
- Co-authored a conference entry which introduces a lightweight convolutional neural network for focus quality assessment applications.
- Authoring a scientific journal entry under Dr. Mahdi Hosseini on the transferability of different convolutional neural networks to datasets with diverse characteristics.

Satellite Operations and Innovation Intern (May 2021-August 2021)
Employer: Canadian Space Agency

Supported the ground operations of the CSA's NEOSSat mission through development of the satellite simulator.

- Developed a C++ based simulator for NEOSSat that accurately simulates satellite processes, including payload processes, on the ground.
- Modified simulator program for smooth portability between 32 and 64 bit architectures.
- Applied knowledge of Real Time Operating Systems to add critical payload functionalities to the simulator.

Stability and Control Intern (August 2020-April 2021)
Employer: Bombardier Aerospace

Supporting aircraft production and ensuring that the company's aircraft adhere to industry standards.

- Built a VBA-based tool that automates the process of evaluating drag characteristics. This tool both reduces error and improves the process speed, and is used by multiple teams in the department to ensure that all aircraft meet customer expectations despite production deviations.
- Simulating aircraft stability and performance under uncontrolled high thrust conditions to develop procedures for unexpected flight conditions and to meet aviation industry requirements.
- Built a historical database of production aircraft performance to ensure that the aircraft processes are improving over time, and to look for areas where we can improve our efficiency and build quality practices.

Research Assistant and Lab Technician - Chemistry Lab (May-August 2019)

Employer: University of Toronto

Under Professor Al-Amin Dhirani, conducted experiments to produce an electrochemical transistor and test the effects of reversible reduction-oxidation reactions on the conductance of a metal film.

- Performed electrochemical experiments such as cyclic voltammetry to ensure the presence of reduction-oxidation, gaining experience conducting physical experiments at a high scientific standard.
- Deposited gold electrodes using vacuum deposition techniques in order to produce the samples.
- Produced circuitry using an Arduino to measure the resistivity across the film at very low temperatures. Improved the accuracy to within 1% of the expected resistivity using a low pass filter.
- Created detailed documentation of all the work accomplished over the course of the project for the benefit of future contributors.

Skills and Qualifications

- **Software:** Experienced with Python, PyTorch, Satellite Tool Kit (STK), MATLAB, GNURadio, Linux, C and Embedded C, VBA, Verilog, and Assembly.
- **Communication and Writing:** Proficient in Microsoft Office, LaTeXtypesetting, and the Adobe Creative Suite.
- **Mechanical:** Experience with engineering drawings, CAD software, assembling circuitry from schematics, and using hand and power tools for construction.
- **Hardware:** Experience programming and using the Arduino, PIC Microcontroller, Raspberry Pi, and FPGAs.
- **Languages:** Fluent in English with intermediate French knowledge.

Relevant Coursework

- **Space Systems Design:** Operations, Systems, Mechanical, Electrical, and Controls and Command Design for an asteroid mining mission up to Preliminary Design Review.
- **Spacecraft Dynamics:** Orbital mechanics, spacecraft attitude determination and control.
- **Computational Structural Mechanics:** Finite Element Methods introduction
- **Control Systems:** Controller design experience analytically and through Simulink for building robust control systems with desirable responses.
- **Engineering Design:** A team of three taking an autonomous robot design from conception to delivery, learning how to effectively work with others to complete a complex engineering project,delivering an engineering report upon completion and keeping a journal to track problems and progress.
- **Mathematics for Robotics:** MATLAB experience, Simulink experience, introduction to autonomous systems and perception.
- **Combustion Processes:** Knowledge of combustion engines, useful for rocket engine theory.
- **Algorithms and Data Structures:** Used Python and C to explore tree structures, graphs, hash tables, and linked lists.
- **Structural Mechanics:** Material selections for aerospace applications, and the fundamentals of Finite Element Analysis.

Projects

Autonomous Robot Design Project (January-April 2019)

Programmed, designed, and built a robot with a team of 3 that synthesized numerous sensors, motors, and microcontrollers to autonomously dispense balls into open canisters and record its success.

- Created software infrastructure using embedded C programming to synthesize actuation with sensing, enabling the robot to drive, turn, recognize canisters, understand when a canister was valid, and dispense accurately.
- Used I2C protocol in order to communicate between multiple microcontrollers and a Real Time Clock module.

- Used a PIC Microcontroller to control actuation, and using PWM manipulation was able to ensure the robot travelled straight consistently. During the final test it did not collide with any canisters due to this calibration.
- PIC also responsible for user inputs from a keypad to initiate the robot and read a summary of its results.
- Programmed the Arduino to control sensing, combining distance readings from an ultrasonic sensor, and brightness inputs from an IR sensor to determine the proximity of the canister and the presence of a previously dispensed ball.

Echo Chamber - HackTech at Caltech (March 2019)

- Used Node.js, HTML, CSS, and JavaScript to create a web application that uses Spotify's web development API to create a playlist based on the mood of recently played music and weekly content about recent listening history.
- Takes the quantitative song metrics that Spotify employs called "Audio Features" in order to produce mood thresholds and classify songs according to the mood they project.
- Created a web application that could create a 3 song playlist that matched the mood of the previously played song, verified with subjective interpretation.

Allergy Scanner - HackNYU (February 2019)

- Using Python UI libraries, OpenCV, barcode recognition libraries, and SQL databases, worked on developing a barcode scanning app that alerts the user of food allergens contained in scanned products.
- The database of foods and their allergen information was created in SQL with a base of 10 foods, and could be added to by the user if necessary.

Image Recognition using Tensorflow (December 2018)

- With TensorFlow and OpenCV libraries, wrote a Python script for the Raspberry Pi that enables the recognition of certain common objects in an image.
- Using a large training set of common images, the model was able to determine which common objects could be found in an image and to display a score which represents its certainty that the object is what it has claimed it to be.
- For objects that were placed into the training set, the model was approximately 70% accurate in correctly determining the object in the image when it gave a confidence score of 50% or greater.

Knife Throwing Target Design (February-April 2018)

- Within a team of 4, designed an improved knife throwing target system that uses photo recognition software, and presented our design to the Stryke throwing range and members of the public.
- Used an engineering based approach to solve a real world problem, producing a Request for Proposal in the process which outlined the objectives, requirements, and metrics of the project.

Python Chess Program (February 2018)

- Using tree structures and optimization strategies, developed an automated chess player that could play against other real players.
- The program could select the optimal move and make it within 15 seconds per move, and made these moves intelligently enough to defeat some of the programs of my peers.

Bridge Design Project (November 2017)

- Using principles learned in my Structures and Materials course, my team and I designed and built a beam bridge that could withstand significant loading of nearly 1 kiloNewton with minimal deflection.

Awards

- **University of Toronto Entrance Scholarship (2017)** Awarded $7500 for excellent academic standing and extracurricular achievements.
- **Anthony A. Haasz Scholarship (2019)** Awards $3600 to a student entering Aerospace Engineering with excellent academic standing.
- **Donald C. Leigh Memorial Scholarship (2017)** Awards $3500 to a student entering the Engineering Science program with excellent academic standing.