Nathan Duncan
Curriculum Vitae

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PERSONAL STATEMENT

Mechatronics and Robotics Engineering student with a 3.9/4.3 CGPA and extensive research experience in multi-agent systems, control theory, and autonomous navigation. A student with strong technical skills, a passion to learn, and a drive to succeed, seeking challenging opportunities to apply engineering principles in research and development.

EDUCATION

Bachelor of Applied Science — Kingston, ON | Expected Spring 2026
Queen's University
Specialization in **Mechatronics and Robotics Engineering**. Holding a **3.9/4.3 CGPA**.
Coursework: Sensors and Actuators; Control Theory; Electronics I-II; Robotics and Mechatronics Design I-III

PUBLICATIONS

Stephenson, J., **Duncan, N.**, Greeff, M. (2024). **Distributed Model Predictive Control for Cooperative Multirotor Landing on Uncrewed Surface Vessel in Waves**. *2024 International Conference on Unmanned Aircraft Systems (ICUAS)*, 645-651. June 2024.

EXPERIENCE

CL2 LAB (UNIVERSITY OF WATERLOO) | Visiting Researcher — Waterloo, ON | May 2025 – August 2025

- Selected for the **University of Waterloo Engineering Rising Stars Fellowship**, a 16+ week summer research program for top Canadian undergraduates.
- Conducted multi-agent UAV experiments using **Crazyflie 2.0** drones, **Crazyswarm**, and custom **ROS** packages.
- Contributed to graduate research on Fictitious Play for **Multi-Agent Reinforcement Learning** by augmenting existing ML libraries with custom game-theoretic environments.

DEFENCE RESEARCH & DEV. CANADA | Control Intern (ISR) — Ottawa, ON | May 2024 – April 2025

- Conducted a **literature review** of over **155** academic publications discussing teams of unmanned aerial systems to create an internal reference document.
- Created a robust hierarchical event-triggered **linear MPC controller** for online management of **multi-UAV missions**.
- Assisted in defence scientist experiments, operating RADAR/sensing equipment, collecting wide-band radio signals, and preparing technical documents.

ROBORA LAB (QUEEN'S UNIVERSITY) | Undergrad. Researcher — Kingston, ON | July 2023 – June 2024

- Co-authored a paper presenting a novel control solution to the rendezvous problem of two agents in an open-water environment.
- Programmed a **custom Python simulation tool** to display state outputs and enable inter-agent communication.
- Contributed to a project creating **spatiotemporal maps** of semi-static shoreline environments via **UAV** and **USV** collaboration.
- Coordinated and performed large set data collections with a custom UAV sensor suite using **ROS** for task execution.
- Utilized **LIO-SAM** algorithm to generate spatial maps in real-time.

UTILITIES KINGSTON | GIS Student — Kingston, ON | May 2023 – July 2023

- Developed and maintained **GIS data** and output products to reflect the current state of assets.
- Conducted analysis of spatial information and generated data queries within the City of Kingston's **largest geographic database**.
- Collected and verified data through field visits using mobile sensors and GPS.

TEACHING EXPERIENCE

QUEEN'S UNIVERSITY | Teaching Assistant (APSC 101) Kingston, ON | Sept 2025 – Dec 2025

- Teaching Assistant for **APSC 101: Problem Analysis and Modeling**, an undergraduate engineering course with approx. 60 students.
- Instructed students on engineering problem analysis and modeling techniques.

PROJECTS

MREN 303 COURSE PROJECT | Mobile Robot Platform Kingston, ON | Jan 2024 – Apr 2024

- Designed, created, and programmed a mobile platform to compete in a head-to-head robotics competition.
- Modeled the platform's chassis and four-wheel differential drive train in **SolidWorks** for fabrication with laser-cut MDF and 3D-printed components.
- Programmed an autonomous line-following routine using a base-mounted color sensor in Python regulated with a **PID controller**.

SAE AUTODRIVE CHALLENGE | Systems Integration Member Kingston, ON | Oct 2022 – July 2023

- Worked as a member of the **Systems Integration** sub-team to bring a Chevrolet Bolt to **Level 4 autonomy**.
- Programmed 5 publisher-subscriber nodes in **C++** using **ROS2** to manage input/output data for the control team.

SKILLS

Languages	English (Fluent), French (Fluent)
Coding	C, C++, Python, NIOS II Assembly, MATLAB/Simulink
Technologies	Linux, Git, Fusion360, SolidWorks, LaTeX
Libraries	ROS, ROS2, StableBaselines3, OpenCV, Django
Licences	G, sRPAS (Basic Operations), Pleasure Craft Operator Card

HONOURS & AWARDS

DEAN'S SCHOLAR | Maintained Engineering Sessional GPA of 3.5+ (Queen's University) 2022-2024
PRINCIPAL'S SCHOLARSHIP | Awarded $4,000 for academic excellence 2021
GOVERNOR GENERAL'S MEDAL | Awarded Bronze Medal for top graduate of secondary school 2021