

# Nathan Duncan

Email: [20ntd1@queensu.ca](mailto:20ntd1@queensu.ca) | Phone: (613) 200-8455  
[linkedin/nathan-duncan-867a83200](https://www.linkedin.com/in/nathan-duncan-867a83200) | [github/nathanDuncan](https://github.com/nathanDuncan)

## EDUCATION

### Bachelor of Applied Science

QUEEN'S UNIVERSITY

Specialization in **Mechatronics and Robotics Engineering**. Holding a **4.0/4.3 GPA**.

**Coursework:** Automatic Controls; Signals and Systems; Data Structures and Algorithms; Mechatronics Design

Kingston, ON | Expected Spring 2025

## WORK EXPERIENCE

### DEFENCE RESEARCH AND DEVELOPMENT CANADA | CONTROL INTERN

Ottawa, ON | May 2024 – Present

- Conducted a **literature review** of over **155** academic publications discussing unmanned aerial system groups, to create an internal reference document and background research.
- Created a robust hierarchal event-triggered MPC controller for UAV swarm missions.

### ROBORA LAB | UNDERGRADUATE STUDENT RESEARCHER

Kingston, ON | July 2023 – May 2024

- Working on a project to create **spatial-temporal maps** of semi-static shoreline environments via Unmanned Aerial Vehicle (UAV) and Uncrewed Surface Vessel (USV) for safe ship-to-shore connections.
- Designed mounting devices for UAV sensor suite and installed **software system** to onboard Jetson computer.
- Coordinated and performed large set data collection during field tests using **ROS Noetic** for task execution.
- Utilized **LiDAR Inertial Odometry Smoothing and Mapping** algorithm to generate spatial maps in real time.

### UTILITIES KINGSTON | GEOGRAPHIC INFORMATION SYSTEMS STUDENT

Kingston, ON | May 2023 – July 2023

- Developed, edited and maintained **GIS data** and other GIS output products to reflect the current status of assets.
- Conducted analysis of spatial information, generated data queries, and summarized statistics within the City of Kingston's **largest geographic database**.
- Ongoing support to the Utilities Engineering Department and GIS Team creating specific maps and applications.

### ENGINEERING DYNAMICS LTD. | PLANT ASSEMBLER

Carleton Place, ON | June 2021 – Aug 2021

- Worked on the factory floor physically assembling high efficiency electronic air cleaner filter media pads.
- Operated and maintained packaging and **manufacturing machines** to size, assemble and finish filter products.
- Adapted to many roles along the assembly line to efficiently produce **over 1000 units** each day.

## PROJECTS

### SAE AUTODRIVE CHALLENGE | QUEEN'S UNIVERSITY

Kingston, ON | Oct 2022 – July 2023

- Worked as a member of the **Systems Integration** sub team and liaison to the Controls sub team on a project to bring a Chevrolet Bolt to **Level 4 autonomy** (5 hr/week commitment).
- Tasked to program 5 publisher-subscriber nodes in **C++** using **ROS2**, to manage the input and output data of the control team and allow programs to execute with optimized time complexity.
- Installed and maintained Chevrolet's Ushr map in **QGIS** using a **PostgreSQL** database to identify superficial road elements and supplement **navigation**.

### MREN 203 COURSE PROJECT | QUEEN'S UNIVERSITY

Kingston, ON | Jan 2023 – Apr 2023

- Tasked with creating an **Unmanned Ground Vehicle (UGV)**, designed for mobile **autonomous monitoring** of volatile air chemicals circulating indoor environments.
- Presented a minimum viable product which could navigate a small room using LiDAR, camera and proprioceptive sensors and create a live web-based heatmap of CO<sub>2</sub> levels that can be monitored remotely.
- Utilized **Raspberry Pi** and Joystick to manually drive the UGV regulated by a **PID** controller and **ROS** commands.

## SKILLS

**Languages:** C, C++, Python, NIOS II Assembly

**Libraries:** ROS, ROS2, TensorFlow, OpenCV, Django

**Technology:** Linux, QGIS, Git, SolidWorks,  $\text{\LaTeX}$ , MATLAB/Simulink

**Licenses:** G, sRPAS (Basic Operations)