Grant Keefe

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EDUCATION

Faculty of Engineering, Queen's University, Kingston ON May 2025(Expected)

- *Candidate for Bachelor of Applied Sciences in Mechatronics & Robotics Engineering*
- *Principal's Scholar, Dean's Scholar – Cumulative GPA 3.6/4.3 (2nd year GPA 3.5 – 3rd year GPA 3.95)*

PROJECTS & EXTRACURRICULAR

President Sep. 2022 - Present

Queen's Aerospace Design Team

- Responsible for managing a team of 60 students across seven sub-teams with a total operating budget of $40,000.
- Participated in weekly meetings for individual sub-teams, offering technical guidance and leadership support.
- Formulated the strategic plan to address member engagement and funding challenges and restarted Queen's aerospace team that had been inactive for years. This detailed plan led to 400 applications to the team, 3-fold increase in team size, and the addition of 4 new sponsors providing new sources of funding.
- As a Software Lead utilized C and data structures to develop a route optimization algorithm and used a raspberry pi as an offboard controller sending serialized commands to fight controller.
- Developed systems engineering skills by leading the eVTOL design cycle, including conceptual design, system requirements, part sourcing, software architecture definition, manufacturing via 3D printing, electrical and mechanical assembly, and deployment.
- Recognitions: Queen's Engineering Design Teams 2023 Internal Development Award
  National Student UAS Competition 2024- 1st prototype realism, 2nd pitch presentation

Ball Gimbal Dec. 2023 - May 2024

- Designed a 2 degree of freedom ball gimbal to mount and stabilize an 400-gram sensor payload to the front of a UAV
- Responsible for all mechanical design work featuring a mix of 3d printed parts and carbon fiber, process helped refine abilities to design products that integrate electronics into small and dynamic form factors.
- Proposed the design of a custom gimbal control board to meet niche requirements of the project and led the design process, iterating through 3 board versions to reach the desired performance.
- Tested control system in Simulink using STL files and calculated moments of inertia to best model gimbal dynamics and behavior before transitioning to firmware.
- Developed advanced mechatronics engineering skills by leading the interdisciplinary design of this gimbal. Through the 3 different design iterations of this project gained valuable skills in CAD, manufacturing, and embedded systems.

Particle Filter Localization Algorithm Feb 2024 - Mar.2024

- Utilized the principles of the AMCL (or particle filter) approach to localization in designing the algorithm following an initialization, prediction, update and resampling state machine.
- The goal of the algorithm was to maintain an accurate robot state with respect to the starting position, given that the starting position was a known location on a known map.
- Developed algorithm and simulation in MATLAB to confirm validity before integrating onto hardware. The algorithm was designed for a differential drive robot with 3 orthogonal range sensors.
- Experience with and development of skills in MATLAB as well as the applications of probability in robotics. The shortcomings of the tests proved the data collected via 3 sensors to be insufficient to support the probabilistic nature of localization.

CO_2 Mapping Robot Dec. 2022 - May 2023

- Proposed a solution for robotics competition involving the monitoring of airflow in large office buildings in the interest of meeting health and safety standards.
- Integrated an Arduino Nano for reading CO2 data and monitoring SHARP data for redundant obstacle detection. It also featured LiDAR for mapping, a Raspberry Pi for processing and control, and an Arduino Uno for PID velocity control.
- Simulation was crucial in software development process. Used Gazebo with ROS2 to test controls, mapping, and navigation, ensuring smooth integration later.
- Learned the challenges of hardware integration and the importance of simulations in robotics to flush out software architectures before intruding hardware points of failure.

Queen's University Varsity Lacrosse Team Sep. 2022 - Present

- 15-20 hour a week commitment
- Recognition: Most Improved Player 2023-2024

PROFESSIONAL EXPERIENCE

GeoSpectrum Technologies Inc., Halifax N.S. May 2024 - Sep. 2024

Electrical Engineering Co-op

- Test engineer in R&D department designing and building methods for testing and troubleshooting complex systems. In depth design work done in SolidWorks and AutoCAD Electrical.

Queen's University, Kingston ON Dec. 2023 - May 2024

Teacher's Assistant for Robotics Design Course

- Responsible for trouble-shooting any hardware/software problems encountered by students throughout the course. Helped students successfully integrate ROS2 into their robot designs and take their first steps towards full autonomy.

Enginuity Inc., Halifax N.S. May 2023 - Sep. 2023

Junior Automation Engineer

- Designed and tested control panel for water mixing and dosing system. Design work done in SolidWorks and AutoCAD Electrical.

TECHNICAL SKILLS

Programming: Git, MATLAB/Simulink, ROS2, Gazebo, C, C++, Python, Arduino
Mechanical Design: SolidWorks + Simulation, FDM 3D Printing, Laser Cutting
Electrical Design: Ki-CAD, Altium, AutoCAD Electrical, STM32 cube mx, Surface mount device (SMD) soldering, Signal probing and analysis, UART, I2C