Nicholas Karantakis

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Education

University of Toronto | Cumulative GPA 3.87/4.0 — Sept. 2023 – Apr.2028
Bachelor of Applied Science and Engineering (B.A.Sc.) in Mechanical Engineering + PEY Co-op — *Toronto ON*
Intended Minors: Robotics and Engineering Business

Experience

Lung Airway and Vasculature Research — May. 2024 – Aug. 2024
Latner Thoracic Research Laboratories and Bazylak Group — *Toronto ON*

- Optimized MATLAB vessel network extraction pipeline using MATLAB Profiler tools and memory allocation techniques to achieve **47% reduction in process time** for extracting the geometric characteristics of lung vasculature and airways from image stacks.
- Developed imaging techniques for mouse lung airways based on casting procedures from literature using MICROFIL and silicone rubber casting material to produce micro-computed tomography images with **over 1000 branch** segments up to **~30 generations**.
- Constructed **simplified airway geometries** for **Computational Fluid Dynamics analysis** from image data using the **Branch Builder** tool.

Airframe Member — Jan. 2024 – Present
University of Toronto Aerospace Team UAS AEAC Drone Team — *Toronto ON*

- Facilitated in the **design**, **building**, and **testing** components of the airframe for the Aerial Evolution Association of Canada UAS competition.
- Crafted and enhanced CAD models for inner and outer wings of preliminary vertical takeoff and landing (VTOL) drone design.
- Fabricated inner wings, utilizing foam, fiberglass, and epoxy resin to ensure optimal **weight reduction** and **structural integrity**.

Production Support — June. 2022 – Aug. 2022
Mitsubishi Heavy Industries Canadian Aerospace — *Mississauga ON*

- Contributed to the production of **Bombardier Global Express 5000 wings** and **center fuselage**, ensuring adherence to quality standards.
- Supported various tasks, including **painting touchups**, **cleaning**, **sandblasting**, operating **pneumatic tools**, **preparing wings** for **leak tests**.
- Enhanced soft skills such as **adaptability** and **communication** by assuming various roles as needed at all stages in production including the spar shop, final inspection and preparation for shipping, demonstrating **flexibility** and a **collaboration** in a dynamic work environment.

Projects

Branch Builder | Python, Blender, Pandas — Aug. 2024
Latner Thoracic Research Laboratories and Bazylak Group

- Developed the Branch Builder tool in **Python** and **Blender** to generate 3D airway models for **Computational Fluid Dynamics analysis**.
- Utilized branch data from CSV files to create **hollow 3D STL branch objects** approximated as straight cylinders with spheres at each junction.

Journey Mapping Project | Python, JavaScript, Flask, Network X, Map Box, OpenStreetMap — Jan.2024 – Apr. 2024
APS112 - Engineering Strategies and Practices II

- Collaborated with a team of six engineering students to develop a **mapping tool** that visualizes the impact of one-way conversions and traffic restrictions on driving routes for our client, the **City of Toronto Cyclists and Pedestrians Team** who frequently make road changes.
- Designed a **user-friendly system** for the client to **modify traffic restrictions** including one-way roads, turn restrictions and diverters using **OpenStreetMap editor** and an **application** powered by **PyQt5** for filtering out non-drivable roads from the editable dataset.
- Built a **webpage** allowing users to input start and destination points to compare optimal driving routes before and after road changes, leveraging the **Mapbox Navigation API** and a **Python backend** that employs the **NetworkX** shortest path algorithm to calculate the fastest route.

Skills

Programming: MATLAB, Python, JavaScript, HTML/CSS
Frameworks: React, Node.js, Flask
Libraries: Git, Pandas, NumPy, Matplotlib, Network X, Media Pipe, Open CV, PyQt5, Mapbox

CAD / 3D Modelling: SolidWorks, Blender, 3D Slicer
Machining: Lathe, Mill, Drill Press
Office Tools: Excel, Word, PowerPoint
Personal: Public Speaking, Adaptability, Problem-Solving, Teamwork