Ryan Dancy

rdancy@uwaterloo.ca • linkedin.com/in/ryan-dancy • github.com/ryandancy

Skills

Languages: Python, C, C++, Java, Go (Golang), JavaScript (ES6), HTML5, CSS, SQL, ARM Assembly

Libraries: Numpy, Scipy, OpenCV, Unreal Engine, React, Node.js, Vue.js, Android

Tools: Linux, Git, Docker, MongoDB, Gradle, AWS

Education

University of Waterloo — *Bachelor of Software Engineering* *September 2019–April 2024 (projected)*

- Cumulative average: **97.7%**.
- International exchange to École Polytechnique Fédérale de Lausanne (EPFL), Switzerland in Fall 2022 term.
- Three First in Class Engineering Scholarships for top performance, Fall 2020, Spring 2021, and Winter 2022 terms.
- Federation of Chinese Canadian Professionals Education Foundation Scholarship for top performance in CS 341 Algorithms.
- President's Research Award, Spring 2021 term.
- Dean's Honours List for all academic terms.
- Placed 45th out of 2200 in the 2019 Senior Canadian Computing Competition (CCC).
- Publication: R.J. Dancy and B.H. Foing, "Europa Life Explorer: A minimum-cost lander mission to Europa," presented at 54th Lunar and Planetary Science Conference (Abstract #1747), Houston, Texas, 2023.
- Highlighted coursework: Quantum Physics (**99%**), Algorithms (**100%**), Computational Complexity (**100%**), Quantum Query and Communication Complexity (ongoing).

Research

Undergraduate Research Assistant, Formal Methods — *University of Waterloo* *May 2021–Present*

- Currently working under Prof. Nancy Day to link the Alloy **formal methods** tool to a custom backend based on SMT solving.
- The project translates Alloy assertions to first-order logic with equality, where the traditional approach translated to SAT.
- Fully reimplemented previous master's thesis project on Alloy and contributed ideas for novel optimizations and techniques.
- Improved George, a proof verification system, by designing new algorithms to extend pattern-matching to first-order logic.
- Joined graduate-level reading group and learned introductory **model checking**, including temporal logic and automata theory.
- Learned the **Lean theorem prover**, including dependent type theory and the Calculus of Constructions.

Experience

Mission Control Inc. — *Robotics and Software Engineer Intern, Ottawa, Canada* *February 2023–April 2023*

- Prepared rover control software plugins to assist in operating the Emirates Lunar Rover on the HAKUTO-R Moon lander.
- Built Python service with **OpenCV** and **Numpy** to find coordinates of the point on the ground corresponding to an image pixel.
- Wrote service performing inverse kinematics to determine motor positions needed for rover's main camera to look at a point.
- Generated ideas like the above for rover operation tools which became major projects of the team ahead of the Moon landing.

European Space Agency — *AR/VR Intern, Darmstadt, Germany* *May 2022–September 2022*

- Created a VR tool in **Unreal Engine 5** with C++ and C# to assist lunar rover operators at the European Space Agency.
- Designed a flexible system supporting arbitrary command sources and simulation outputs through adapters.
- Scripted process to combine **digital elevation models** (DEMs) into a single landscape using geospatial libraries such as GDAL.
- Streamed video from simulation to external ports to enable future rover practice campaigns to be performed fully within the tool.

Mission Control Inc. — *Robotics and Software Engineer Intern, Ottawa, Canada* *August 2021–December 2021*

- Integrated pan-tilt-zoom camera into rover software in **C++** in preparation for the ESA-ESRIC Space Resources Challenge.
- Computed transformations between camera reference frame with **OpenCV** to display field of view of rover's secondary camera.
- Designed flexible Vue.js application in TypeScript for analyzing data from the Emirates Lunar Mission, the groundwork for which later evolved into one of the company's two main products with a dedicated team.

Uber — *Software Engineer Intern, Remote* *January 2021–April 2021*

- Executed a successful ground-up refactor of the **Go** backend microservice of a trip-critical widget in the Uber rider app.
- Achieved **100% test coverage** while designing an extensible framework to allow many teams to integrate into the widget.

Wish — *Software Engineer Intern, Remote* *May 2020–August 2020*

- Created new Wish Local onboarding experience, boosting local store signup to product upload conversion rate by **285%**.
- Powered features from a **Python** backend interfacing with MongoDB; wrote **SQL** queries on Treasure Data to automate reports.

Midnight Sun Solar Car Team — *Firmware Lead, Waterloo, Canada* *January 2020–April 2022*

- **Led the development** of a distributed firmware system written in embedded C in a **Linux** environment to control a solar vehicle.
- Built two large firmware projects for **ARM**-based STM32 microcontrollers to monitor solar panels and control power.
- Led meetings, managed 20 team members, and reviewed all code entering the repository at github.com/uw-midsun/firmware_xiv.