

# DEREK WANG

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## Education

### University of Waterloo

*Bachelor of Applied Science in Computer Engineering*

**Expected Apr 2030**

GPA: 3.7

## Experience

### Autonomous Self Driving Software Engineer

*WATonomous*

**Sept 2025 – Present**

*Waterloo, ON, Canada*

- Coordinated collection and annotation of a comprehensive dataset of 3,448 images (3,087 train, 240 valid, 121 test) for object detection, implementing strategic data augmentation including rotation, scaling, and color jittering
- Trained YOLO11s object detection model using Ultralytics framework, achieving 80% mAP (mean Average Precision) from 30% baseline through hyperparameter optimization (learning rate scheduling, batch size tuning)
- Exported trained model to ONNX format with onnxslim optimization for embedded deployment, while maintaining inference accuracy, enabling real-time inference at 30 FPS on rover hardware for autonomous navigation

### Autonomy Developer

*Waterloo Aerial Robotics Group*

**Aug 2025 – Present**

*Waterloo, ON, Canada*

- Developed Hardware-in-the-Loop (HITL) simulation systems in Python using MAVLink protocol, addressing autonomous flight testing requirements for the 2026 National Annual UAS Student Competition
- Redesigned GPS movement architecture using periodic functions for continuous position updates, eliminating unrealistic teleportation behavior and creating smooth trajectory interpolation systems

### Robotics Software Programmer – VEX Robotics Competition

*Checkmate Robotics Club*

**Sept 2024 – June 2025**

*Markham, Ontario*

- Programmed competition software for Team 16868C Rushdown using Odometry positioning and PID Controllers, implementing precise motion control and comprehensive error handling that reduced positioning error by 40%
- Designed navigation algorithms with motion profiling and path planning, creating autonomous match routes and skills routines that placed 5th at Provincials (80 teams) and earned an invitation to the 2025 VRC Worlds (top 10% globally).

## Projects

**Coffee Chat Scheduler** | React | Python | FastAPI | PostgreSQL | Google Calendar API | Git | [Source Code](#) | [Live Demo](#)

- Built a full-stack web application using React and FastAPI, integrating Google Calendar API via OAuth 2.0 authentication with RESTful API endpoints, error handling, and CORS configuration
- Implemented real-time availability checking and automated calendar event creation, storing booking data in a PostgreSQL database with SQLAlchemy Object Relational Mapping, reducing booking confirmation time to under 1000ms

**Autonomous Vehicle Control System** | C++ | ROS2 | Docker | CMake | Foxglove | [Source Code](#) | [Demo Video](#)

- Engineered LiDAR-based perception pipeline processing sensor data to generate real-time costmaps with 0.1m resolution, integrating persistent memory mapping system for 95% accurate dynamic environment representation
- Architected a modular ROS2 navigation stack using A\* pathfinding and Pure Pursuit control, achieving sub-0.5 m waypoint accuracy and 100% obstacle avoidance across 50+ scenarios.

**Fruit Ninja AI** | Python | YOLO11 | [Source Code](#)

- Architected and implemented an automated computer vision pipeline using YOLO11n object detection, achieving 90% precision, 87% recall, and 0.89 F1 score with 0.92 AUC in fruit classification across 8 fruit categories
- Built comprehensive dataset of 816 images (514 training, 302 testing), optimizing model performance through data augmentation techniques

## Skills

**Languages:** C++, C, Java, Python, HTML5, CSS, JavaScript, TypeScript, SQL

**Engineering Tools:** Git, Fusion 360, Docker, Foxglove, PostgreSQL, MongoDB, Supabase

**Technologies:** React, FastAPI, Node.js, Express, ROS2, PyTorch, OpenCV, Ultralytics, Tailwind CSS

**Certifications:** Docker Foundations Professional