Derek Wang

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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

Experience

Autonomous Self Driving Software Engineer **Sept 2025 – Present**

WATonomous *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 **Aug 2025 – Present**

Waterloo Aerial Robotics Group *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 **Sept 2024 – June 2025**

Checkmate Robotics Club *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

Silhouette | React | Next.js | Express.js | MongoDB | Google Gemini | Overshoot SDK | *Source Code* | *Live Demo*

- Built a full-stack AI fashion advisor enabling real-time body annotation and outfit visualization, processing live camera input with sub-500ms interaction latency
- Implemented a Next.js + React frontend and Express.js backend with MongoDB Atlas, supporting 3+ style pipelines (Streetwear, Formal, Sporty) and dynamic product linking
- Orchestrated multiple AI services (Gemini + Overshoot SDK), handling async inference, rate limits, and prompt pipelines to generate personalized recommendations in under 2s per request

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 SQLModel 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.

Education

University of Waterloo **Expected Apr 2030**

Bachelor of Applied Science in Computer Engineering GPA: 3.7