Alexander Wang

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EXPERIENCE

General Motors | *MATLAB, Simulink, C++, Python* — May 2024 – Present
Software and Controls Intern – Electric Vehicle Propulsion and Thermal Management — *Markham, ON*

- Utilized embedded C to develop thermal control system software for battery, power electronics, and cabin comfort.
- Created automated test stands on dedicated physical servers (bare-metal) for Software-in-the-Loop co-simulations.
- Designed and implemented a novel C++ testing architecture from the ground up with the CppUTest framework.
- Developed a testing and analysis pipeline in Python – automating performance analysis from **4-5 days to minutes**.

SAE AutoDrive – Toronto Autonomous Vehicle Team (aUToronto) [↗] | *C++, Python, ROS2, Linux* — 2023 – Present
State Estimation Lead, Team Founder — *Toronto, ON*

- Led autonomous vehicle team to win **1ST place** in every competition event at the R2Y3 SAE AutoDrive Challenge.
- Developed C++ multi-sensor fusion algorithms (i.e., Extended Kalman Filter) for state estimation and localization and designed integrity monitoring system against sensor failures (GPS, IMU, Wheel Encoders, LiDARs, and Cameras).
- Programmed a variable L-Band attenuator to simulate GPS signal dropouts through Serial during in-vehicle testing.
- Implementing deep learning visual semantic and inertial LiDAR odometry algorithms for GNSS-unavailable localization.

RTX – Pratt & Whitney | *HTML/CSS, JavaScript, React, SQL, OracleDB* — May 2022 – Aug 2022 || May 2023 – Aug 2023
Software Engineering Intern – Control Systems Team — *Mississauga, ON*

- Developed multiple scalable full stack software tools with JavaScript and React for data analysis and visualization – improving the Control Systems team's project delivery times **by 15%**.

RESEARCH & PUBLICATIONS

University of Toronto – Toronto Robotics + AI Lab (TRAIL) [↗] | *Python, AWS, OpenStreetMap* — May 2024 – Present
AI & Robotics Researcher – 3D Lane Detection / Labeling for Autonomous Vehicles — *Toronto, ON*

- **Authoring 2 papers** on a Bayesian Attention-based 3D lane detection model and the development of BoreasLane, the first 3D winter condition lane dataset; targeting submission to the International Conference on Computer Vision (ICCV).
- Integrated GPS, Camera, and LiDAR sensor data into automated lane labeling and refinement pipeline – using multi-threading, multi-processing, and caching to **decrease runtime by 43%**.

PROJECTS

TARS-AI – Open Source Community [↗] | *Python, Raspberry Pi, Fusion360, GitHub* — Dec. 2024 – Present
Co-Founder — *Global*

- Co-founded and led the development of TARS-AI, an open-source community project dedicated to creating the robot TARS from my favourite childhood film Interstellar – growing the community to **100+ members** in **1 month** of launch.
- Designed a modular software architecture for speech, personality, memory, intent classification, vision and servo control.
- Configured sensors, servos, and peripherals to GPIO, I2C, SPI, and I2S interfaces – troubleshooting with a multimeter.

EDUCATION

University of Toronto: cGPA 3.6/4.0 — Toronto, ON
Robotics Engineering — *Expected: April 2026*

Certificates: Private Pilot's License (PPL) || TensorFlow Developer Certificate || Oracle Database SQL Certified Associate
Courses: Control Systems || Microcontrollers & Embedded Microprocessors || Electronics for Robotics || Math for Robotics

SKILLS

Skills: C/C++, Python, MATLAB, Simulink, Fusion360, Linux, Shell/Bash, AWS, JavaScript, React, SQL, OracleDB, Git, Jenkins, JIRA
Embedded Systems: CAN, Ethernet, LIN, GPIO, I2C, SPI, I2S, ROS/ROS2, Raspberry Pi, STM32, Arduino, DE1-SoC FPGA
Simulation & Testing Tools: Simulink, Gazebo, RViz, CppUTest, Google Test, GMock, pytest