

Kelvin Cui

ROBOTICS ENGINEERING SCIENCE STUDENT

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Summary

Hello! As a detail-oriented engineering student, I'm seeking to learn more about robotics, particularly in the world of autonomous vehicles. I bring a motivated, open-minded attitude, and I can quickly teach myself to tackle any problem. I am confident that I would be an asset to your team, and I would love to show you what I can achieve!

Education

University of Toronto, St. George Campus

CGPA: 3.7, Dean's Honor List

BASC ENGINEERING SCIENCE - ROBOTICS MAJOR, AI MINOR, CERTIFICATE OF ENGINEERING LEADERSHIP

2018 - 2023 w/ Co-op

Courses include : Computer Vision, Deep Learning, Control Systems, Embedded Systems, Algorithms/Data Structures

Skills

Python, C++, ROS/2, MATLAB Machine Learning, Databases, GitHub, Object-Oriented Principles, Embedded Systems

Experience

University of Toronto Formula Racing Team

Toronto, ON

DRIVERLESS TECHNICAL DIRECTOR (2022 - PRESENT), SOFTWARE LEAD (2021-2022), AERODYNAMICS LEAD (2020-2021)

September 2018 - Present

- Created Driverless division to compete in autonomous dynamic events - the first undergraduate team from North America.
- Recruited and mentored over 20 new engineers for Driverless, and raised over 3 thousand dollars in sponsorship funding.
- Architected Driverless Stack in ROS/C++, while using PyTorch/Python for Perception, allowing team to access 35% more points at competition.
- Researched and implemented novel solutions, such as YOLOv7 for stereo vision perception and deep-learning-based Model Predictive Control.

Ribbit

Toronto, ON

ROBOTICS SOFTWARE ENGINEERING INTERN

September 2021 - August 2022

- Created Software-In-Loop Scenario Manager package to allow for repeatable flight simulations and metric logging, speeding up testing.
- Reduced simulation-to-real gap by helping tune simulation inner and outer loop controllers, and developed hardware-in-the-loop features.
- Built sensor drivers with abstraction layers in ROS/C++, interfacing over Serial/Ethernet protocols.
- Profiled and removed communication bottleneck between GUI Frontend and Backend in Python/JS, increasing throughput by 50%.

Toronto Robotics and AI Laboratory

Toronto, ON

RESEARCH ASSISTANT

May 2021 - September 2022

- Helped tune different Fusion-based 3D Object Detection methods for comparison in adverse weather scenarios.
- Investigated Boundary-Layer Sliding Control for robustness against turbulence.
- Improved drone performance in windy conditions compared to simple PID with feedforward.
- Implemented Kalman Filtering and Fourier Transform nodes to estimate wind disturbances in ROS/C++.

Cisco Systems

Toronto, ON

TECHNICAL SALES ENGINEERING INTERN

June 2020 - August 2020

- Designed COVID screening and contact tracing solution, creating IOT hardware sensor that was 60% more accurate than current solutions, with API integration at a fraction of the cost.
- Programmed Webex bots in Node.Js, helping team achieve 3rd place finish in a company-wide innovation challenge.
- Increased team knowledge of Webex through seminars and created a promotional video winning first-place in an intern sales competition.

Projects

FSAE Driverless 2D Cone Detection Model

UT FORMULA RACING

- Created and tuned R-CNN Inference Model for Formula Student cones in-context to use for auto data-labeling.
- Implemented using Detectron2, and created Google Collabratory tutorial for incoming UTFR Driverless members.

OpenCV Lane Following Robot

[HTTPS://GITHUB.COM/KELVIN-CUI/AUTONOMOUS_LANE_ROVER](https://github.com/kelvin-cui/AUTONOMOUS_LANE_ROVER)

- Created robot that follows a circuit using OpenCV to detect lane lines, a simple PID cross-track error controller and ROS/Python.
- Designed modular mobile robotics platform to house Raspberry Pi, camera and battery using Solidworks to be 3D printed.