

DARREN LIU

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Technical Skills

Software: Python, Java, C, C++, HTML/CSS, JS, Git, VSCode

Embedded Systems: Arduino, ESP32, STM32, Raspberry Pi, Soldering, Circuit Design, Altium

Experience

First Robotics Competition Team 7902

Oct 2022 – May 2024

Programming Lead

Markham, ON

- Acted as project manager, leading a team of 6, delegated members to different subsystems, conducted rapid prototyping, managed timeline & task list using Github, resulting in **13,000** lines of code in **60+** different classes
- Applied control systems concepts such as PID feedback loop, feedforward, odometry, command groups
- Implemented an RPi-based vision processing client to triangulate the robot's distance from the target and automatically adjust the arm angle accordingly
- Led weekly meetings teaching subsystem-command/OOP approach to coding in Java in the WPILib software library
- Operated robot & won finalist and judges awards at Centennial & Durham events out of **30** teams & **1000** participants

University of Toronto

Jan 2024 – May 2024

Pure Math Research Mentee

Toronto, ON

- Attended weekly 1:2 sessions learning about topology from a PhD student, touched on fields of math such as group theory, abstract algebra, and combinatorics
- Presented a research project alongside another student regarding our research findings on the composition of covering maps on topological spaces

AliceHacks

Mar 2023 – Nov 2023

Outreach Coordinator

Markham, ON

- Coordinated logistics, scheduling, prize distribution, workshops, events, judging, and promotional videos resulting in the engagement of over **400** registrants in **30+** different countries with over **90** group project submissions
- Reached out to sponsors, assisting in acquiring over **\$1000** in funding

Mathnasium

Aug 2022 – Aug 2024

Math Instructor

Markham, ON

- Improved confidence and achievement in **60+** students per shift from a K to grade 12 level through Socratic questioning and strategic intervention, ensuring deep understanding of concepts.

Projects

Differential Swerve Drive | C++, ESP32, Control Systems

Jun 2024

- Initiated a differential swerve drive project using 3d printing with the goal of developing firmware & programming skills
- Wrote low-level firmware on a motor & encoder, creating a motor controller with a PID feedback loop to allow precise control of speed and position and wrote higher-level code to allow full control of the module in two axes of rotation

Smart Trash Bin | C++, ESP32, OpenCV, Python - Hack The 6ix

Jul 2024

- Incorporated ultrasonic and motion sensors along with a servo motor to automatically sort waste based on results from a camera running an OpenCV model utilizing serial communication
- Collaborated with a team to make a garbage bin gamifying the recycling process, rewarding points to users on a Flask server based on correct guesses. Points were routed to a leaderboard stored on a database

Smart Plant Pot | C++, Arduino, OpenCV, Python - Hack The Valley 8

Oct 2023

- Collaboratively built a functional flower pot project that tracks its humidity/light levels using a phototransistor and humidity sensor, using an LLM to communicate its needs with TTS, to make owning a plant more engaging
- Coordinated the sensors with an LED matrix and LCD with I2C communication protocol & C++ to display stats

Education

University of Waterloo

2024 – 2029

Candidate for BAsC in Electrical Engineering, Telus Scholar

Waterloo, ON

- Firmware Division Member of Midnight Sun Solar Car Design Team
- Academic Class Representative for Electrical Engineering 2029 Cohort