Elil Thirumugam

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Technical Skills

Languages & Frameworks: C/C++, Java, Python, JavaScript, HTML, CSS | yolov8, roboflow, react, firebase

Developer Tools: MS Office, Adobe Acrobat, AutoCAD, SketchUp, SolidWorks, MATLAB, Git, Visual Studio

Libraries and API: Pandas, NumPy, Gspread, Selenium, flet, pycharm, only-office, taskade

Power Tools: Milling Machine, Lathe, Vertical & Horizontal Bandsaw, Drill Press, Belt and Disk Sander, CNC Machine

Experience

VRC Team Lead Programmer and Drive Team Mar. 2024 – Mar. 2025

Zebra Robotics *Mississauga, ON*

- Incorporated PID control in C++ using motor encoders and an IMU to reduce wasted motion by 15%.
- Built a passive climb mechanism and integrated a toggle element using a 25mm pneumatic cylinder and double-acting solenoid valve, creating a compact and reliable lift system to elevate robot by 1.8 inches.
- Generated an autonomous skills program in C++ with PROS (GCC), combining IMU and encoder feedback to tune PID to execute repeatable paths, securing 7^{th} at provincials and strengthening team qualification prospects.

Engineering Club Founder & President Mar. 2024 – Jun. 2025

Mayfield Secondary School *Caledon, ON*

- Generated an presented Google Slides decks for 30 + students, increasing engagement and participation.
- Demonstrated PID theory through Arduino 360° servos and taught material design concepts using VEX Pieces.
- Mentored capstone projects by provisioning parts, scheduling 4 stage-gate checkpoints, and running weekly debug sessions, yielding functional projects (e.g., pill dispenser) that strengthened portfolios and applied learning.

Downey's Farm Market Employee Sept. 2022 – Present

Downey's Farm Market *Caledon, ON*

- Independently managed end-to-end food truck operations, processing 300 – 400 customer orders daily while adhering to food safety protocols and effective communication, resulting in improved customer retention.
- Maintained a 30-step daily operations checklist and tracked 40 + SKUs by coordinating deliveries and reconciling counts, reducing stockouts and overbuys to lower expenses and protect peak-hour throughput and margins.
- On-boarded 25+ employees on operating a food truck, improving leadership skills and seamless workflow.

Projects

Laptop Web Scraper | *Python, JavaScript, Selenium, Visual Studio* Aug. 2025

- Built a web scraper in Python with Selenium to parse 17 000 + laptop listings, cutting manual search by 95%.
- Implemented robust DOM interactions—CSS selectors, XPath, and JS execution—to navigate through hidden buttons, nested nodes, and embedded SVGs, ensuring full page coverage and fewer selector breaks.
- Streamed parsed fields (names, prices, discounts) through Pandas data frame and synced to Google Sheets via gspread with 50 ms backoff, staying within quota limits and enabling shareable live analysis.

Pill Dispenser | *Arduino UNO, C++, Git* Jun. 2024

- Integrated PWM signals to control the speed and torque of servo motors to ensure pills are dropped accurately.
- Added a push-button interface with a LCD display for mode selection, leveraging a state-machine control algorithm to toggle between 2 operational modes with <100ms response time and 80% input reliability.
- Implemented OR-of-NOT logic in C++ to allow dynamic selection of dispensing quantities at runtime.

AI-Powered Smart Waste Bin | *WolfHacks 2nd* | *Fusion 360, Arduino, Gemini API, Computer Vision* May 2025

- Engineered real-time waste classification with webcam CV and the Gemini API achieving 90% accuracy, enabling reliable routing, lowering contamination and powering the downstream automation at scale.
- Automated 4-bin disposal by driving PWM servos via a C++ state machine synced to classifier output, reducing contamination by 70% and increasing throughput by 25% while cutting re-sort labor and costs.
- Built an enclosure in Fusion 360 with parametric cutouts, ensuring jam-free movement and alignment.

Education

University of Waterloo Sept. 2025 – Present

BASc. Mechatronics Engineering, President's Scholarship of Distinction

Relevant Courses: Mechatronics Engineering, Digital Computation, Calculus 1, Linear Algebra