

# ETHAN NIXON

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## SKILLS

+ **Softwares:** Altium Designer, KiCAD, PSpice, LTspice, Quartus Prime, Solidworks, Inventor,  
**Programming :** C, C++, Python, Verilog, PyTorch, OpenCV, Perl, REACT, MATLAB, bash

## EDUCATION

**McMaster University**

BASc Candidate for Bachelors of Computer Engineering, 3.8 GPA

**Hamilton, ON**

**Sept 2024 - April 2028**

## EXPERIENCE

**McMaster Mars Rover** | *Electrical Team Lead & Battery Subsystem Lead*

**September 2024–Present**

- **Leading & Managing** all members of the Electrical Team to develop a fully functioning V3 Rover Electrical System, overseeing both **Schematic & PCB reviews**, board validation, and assembly.
- Developing a custom **6-layer Battery Management System (BMS)** PCB featuring an **STM32**, passive balancing, protection circuits, and high-accuracy current/voltage sensing for rover telemetry.
- Designed and validated a 4-layer **Teensy 4.1**-based communication board integrating **GPS** and **LoRa** modules with **dual RF power domains**, fan controllers, a servo driver, and diagnostic indicators for telemetry and autonomous control operations.
- Assembled and tested **15+ 24 V stepper motor controller boards**, evaluating electrical performance, efficiency, and thermal stability under varying mechanical loads.
- Developed and validated a **6-layer, 4-phase 48 V → 24 V buck converter** with integrated fault indicators, soft-start behavior, custom thermal mitigation, and an **output protection stage**.

**Onside AI** | *Computer Vision & Machine Learning Intern*

**October 2025 – Present**

- Designed a **vision-based AI detection system** that integrates object recognition, behavioral cues, and apparel classification, optimized for multi-class security-camera perception.
- Trained and refined multiple **YOLO models** in **Python/PyTorch**, including a dual-model architecture to address class-imbalance issues, improve stability, and achieve accurate **real-time inference**.
- Developed a **multimodal analysis pipeline** that combines YOLO detections with contextual reasoning based on VLM, allowing for improved state-classification and reduced chance of false positives.

**Dentra** | *Electrical Design Intern*

**May 2025 – Aug 2025**

- Developed **electrical schematics and prototype circuits** for wearable dental diagnostic hardware, validating performance through **PSpice** simulations.
- Collaborated within the hardware team to design and test power delivery subsystems, including **LDO regulators**, **LiPo charging circuits**, and **UV LED drivers** under varying load and thermal conditions.
- Supported schematic bring-up in **Altium Designer**, advising on component selection, PCB layout practices, and grounding, trace width, and thermal management design parameters.
- Ensured hardware safety and performance by integrating temperature-protection features and validating **current limits**, **voltage tolerances**, and thermal margins through iterative bench testing.

**Culinary Compass** | *Machine Learning & Data Science Intern*

**March 2025 – July 2025**

- Contributed to the design of multiple **AI-driven menu recommendation systems**, achieving up to **95% precision** in recommendation relevance.
- Conducted structured technical reviews of LLM-based, embedding-based, and **TF-IDF + cosine similarity models**, comparing performance across synthetic user profiles using an LLM judge.

## PROJECTS

- **Electric Scooter Soldering, C++, 3D Printing** **September 2025**  
Designed and built a custom electric scooter integrating a BLDC motor, ESC, **throttle speed control**, a tack-welded Li-ion battery pack, BMS, and an **onboard speed/data display**.
- **Blurify: Fast & Easy Video Blurring Python, OpenCV, MoviePy, Streamlit** **June 2025**  
Built an AI blurring web app at **SpurHacks 2025** to detect and blur sensitive elements in videos. Used **OpenCV** for processing, **MoviePy** for synchronization, and deployed via **Streamlit**.
- **Smart Watch Python, Flask, React, ESP32, OpenCV, EasyOCR, C++** **March 2025**  
Built an assistive watch for a client with **Usher's Syndrome** using an ESP32 camera and **Flask** server. The device reads labels at the push of a button and does **TTS**, Achieved **85% accuracy** and added **temperature-based audio alerts**.