

# Erich MacLean

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## SUMMARY

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MASc candidate in Engineering (Artificial Intelligence) at the University of Guelph with a BEng in Computer Engineering. Research focused on safety-critical ML systems for autonomous vehicles, achieving up to 97% collision prediction accuracy using multimodal simulation and eye-tracking data. Hands-on experience in real-time data pipeline engineering, cloud AI deployment, Linux systems administration, and embedded systems design. Seeking roles in ML systems engineering, edge AI, or embedded software at companies working on autonomous systems, robotics, or semiconductor products.

## TECHNICAL SKILLS

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**Languages:** Python, C, Java, JavaScript, VHDL, Assembly

**Libraries & Frameworks:** PyTorch, TensorFlow, OpenCV, Scikit-learn, NumPy, Pandas, Matplotlib, Tkinter, YOLO

**Tools & Platforms:** SCANer Studio, Microsoft Azure, Azure Cognitive Services, Azure Functions, AWS, Git, Jira, Apache Spark, Apache Hadoop, ROS2, VirtualBox, Oracle Cloud VM

**Areas:** Machine Learning, Embedded Systems, Real-Time Systems, Data Pipelines, Computer Vision, Digital Logic, FPGA Design, Big Data, Linux Systems Administration, Network Configuration

## EXPERIENCE

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**Driving Simulator Lab Technician & Developer** | University of Guelph | Guelph, ON *May 2022 - Aug 2023*

- Engineered a USSRA-funded Python pipeline interfacing with the SCANer Studio scripting API, eliminating a post-simulation export bottleneck that reached 2 hours per 15-minute run through live data capture during active simulation execution
- Designed a Tkinter GUI enabling non-technical researchers to operate the pipeline directly; defined output formats and naming conventions collaboratively with psychology, CS, and CompEng research teams
- Constructed multi-scenario simulation environments in SCANer Studio including road layouts and hazard configurations for researcher-defined experimental designs
- Maintained a 9-PC networked simulation stack; diagnosed and resolved recurring hardware and software failures on aging equipment to sustain continuous lab operations
- Conducted vendor outreach and cost-benefit analysis to identify hardware and software upgrade paths; engaged with simulator research teams at the University of Waterloo and University of Toronto to benchmark configurations and inform upgrade recommendations

**Teaching Assistant** | University of Guelph | Guelph, ON *Sep 2023 - Dec 2025*

- Delivered labs, seminars, tutorials, and office hours for Digital Systems Design and Computer Organization and Design
- Produced supplementary learning materials covering VHDL, digital logic, and CPU architecture to strengthen student comprehension of core CompEng concepts
- Assisted with grading assignments, reports, and examinations; nominated for Teaching Assistant of the Year by the College of Engineering and Physical Sciences in 2024 and 2025

**IT Support Co-op** | D2L | Kitchener, ON *May 2024 - Aug 2024*

- Built an internal web application integrating Azure Cognitive Services image recognition to scan asset barcodes and execute bulk Jira API operations, replacing a manual per-device update workflow and reducing asset processing overhead across deployment, retrieval, and decommissioning workflows
- Deployed application on Azure Web Services with domain-level and role-based access controls restricting use to authorized D2L personnel
- Migrated user domain management scripts from persistent Azure VMs to Azure Functions, eliminating continuous VM infrastructure costs and transitioning Entra ID and Active Directory operations to an event-driven execution model
- Centralized migrated scripts in a D2L-managed GitHub repository, improving version control, maintainability, and team access
- Managed macOS and Windows device lifecycle operations including data migration, OS reinstallation, backups, and factory resets across a mixed-platform enterprise environment

## PROJECTS

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### **Collision Prediction Framework -- Autonomous Vehicle Safety Systems**

May 2023 - Apr 2026

*MASc Thesis Research, University of Guelph*

- Developed and evaluated multimodal ML classifiers for real-time vehicle collision prediction using simulation driving and eye-tracking data
- Achieved up to 97% prediction accuracy within practical distance-to-hazard and time-to-intersection thresholds; validated models temporally and spatially relative to hazard vehicle position
- Produced a generalizable evaluation framework for assessing ML model reliability under real-world physical constraints, applicable to ADAS and autonomous driving validation pipelines
- Investigated PyTorch, TensorFlow, YOLO, and OpenCV-based approaches during model development; operated full-body driver-in-the-loop OKTAL simulator with SCANeR Studio

### **Personal Home Server and Secure Mesh Network**

2023 - Present

*Personal Project*

- Configured a repurposed laptop as a Ubuntu home server, self-hosting file storage, media streaming, and game server services
- Deployed a Tailscale mesh VPN across all personal devices with per-device firewall rules on Windows, Ubuntu, and Linux to enforce network-level access control
- Engineered a CGNAT bypass using an Oracle Cloud VM as a relay node, enabling external access to home network services without a public IP address
- Configured DNS records on a personal domain to route self-hosted services and developed a Python web scraping automation delivering daily compiled content via scheduled GitHub Actions workflows

## EDUCATION

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### **Master of Applied Science, Engineering (Artificial Intelligence)**

Sep 2023 - Apr 2026

*University of Guelph, Guelph, ON*

Research-based degree with thesis on vehicle collision prediction for autonomous driving-assistive systems. Built and evaluated multimodal ML models using simulation driving and eye-tracking data, achieving up to 97% prediction accuracy within practical distance and time-to-intersection thresholds. Produced a generalizable evaluation framework for ML-powered vehicle safety systems.

### **Bachelor of Engineering, Computer Engineering**

Sep 2019 - Apr 2023

*University of Guelph, Guelph, ON*

Coursework spanning embedded systems, digital logic and FPGA design, computer architecture, real-time systems, microcontroller interfacing, and large-scale software architecture. Capstone: designed and built an electric drive attachment for manually powered wheelchairs in collaboration with mechanical and systems engineering students.

## AWARDS & RECOGNITION

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- Nominated for Teaching Assistant of the Year -- College of Engineering and Physical Sciences, University of Guelph (2024, 2025)
- Dean's Honor List -- University of Guelph, Fall 2021
- Sigung Bob Schneider Memorial Award -- Waterloo Kung Fu Academy, 2019 (leadership and consistent contribution)
- Student of the Year -- Waterloo Kung Fu Academy, 2019 (discipline, spirit, and dedication)