Joel Andrew Miller

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Passionate about leveraging data-driven technology to build machines and applications designed for people.
M.E.Sc. educated in Software Engineering and Artificial Intelligence, with hands-on experience in industry research and development.

WORK EXPERIENCE:

ITPS/ITTC — **London, Ontario**
R&D Aerospace Software Engineer — *February 2025 – January 2026*

- Designed & deployed a pilot-tested, real-time head tracking and sensor fusion systems for a wireless helmet mounted display.
- Designed and implemented outside-in optical tracking systems using Optical-IMU sensor fusion to achieve 2° spatial accuracy
- Implemented Kalman-based IMU drift correction, achieving stable head orientation tracking in long-duration simulations.
- Integrates and optimizes tracking pipelines for low-latency, on-device execution achieving 3ms latency in a distributed pipeline.

National Research Council Canada — **London, Ontario**
R&D Engineering Intern — *September 2023 – December 2023*

- Designed a pipeline to transform real-world sensor data (LiDAR, camera, GPS) collected from a vehicle to simulated environments for autonomous vehicle development and testing.

IBM — **Markham, Ontario**
Software Engineer/DevOps Intern — *May 2021 – September 2022*

- Developed automated testing frameworks for IBM's Order Management System, reducing testing time, enhancing efficiency and ensuring system reliability; Setup a Dockerized virtual machine integrated with a web application, to execute and monitor automated test cases; Mentored/onboarded interns; Developed frontend components, to improve the user's interaction and experience.

Additional Employment from 2015-2021: *Basic Operations @ NIEPlus | Zipline Guide @ WildPlay | Lifeguard & Swimming Instructor @ YMCA*

EDUCATION:

Western University — **London, Ontario**
M.E.Sc Software Engineering with Collaborative Specialization in Artificial Intelligence — *May 2023 – Dec 2024*

- Worked towards human-centered autonomous vehicles by researching conditionally autonomous takeover requests.
- Employed signal processing, data fusion, time series analysis, and deep learning to model and understand driver's cognitive behaviour through their physiological signals (ECG, EDA, RSP).
- Submitted research findings to three journals for publishing, completing program four months early with a 4.0 GPA.

B.E.Sc Software Engineering with IBM Co-op — *September 2018 – April 2023*

PROJECTS and LEADERSHIP:

Manuscripts — *May 2023 – Dec 2024*

- **Published:** "*Navigating the Handover: Reviewing Takeover Requests in Level 3 Autonomous Vehicles*" (IEEE Open Journal of Vehicular Technology): A comprehensive review of Takeover Requests (TORs) in autonomous vehicles, emphasizing safe human-centered transitions from automation to manual control.
- **Published:** "*At the Heart of Intersections: Analyzing Their Influence on Driver Heart Behaviour*" (Springer Data Science for Transportation): Investigated intersections' impact on driver heart rates to inform safer urban traffic designs and autonomous vehicle technologies.
- **Under Review:** "*Modelling Takeover Requests in Conditional Autonomy Using Machine Learning and Driver Physiological Signals*" (IEEE Transactions Intelligent Transportation Systems): Developed adaptive machine learning models using physiological data to enhance driver takeover quality during autonomous transitions.

CARLA RL Agent (*Masters Project)* — *January 2024 – April 2024*

- Designed and implemented a reinforcement learning agent for autonomous vehicle navigation in the CARLA simulation environment, leveraging Deep Q-Learning and PPO algorithms.
- Fine-tuned reward functions to balance efficiency and exploitation, improving learning rates and decision-making accuracy.

FoodSnap (*Capstone Project)* — *September 2022 – April 2023*

- Engineered a machine learning application to analyze the nutritional content of meals from single images, integrating image segmentation, depth estimation networks, and the USDA API.
- Achieved accurate identification of food types and volume estimation, enabling precise calorie and macronutrient calculations.
- Demonstrated the project's scalability and potential impact in nutrition tracking through real-world testing scenarios.

Western AI Club (*Project Manager)* — *September 2021 – April 2022*

- Led a team of five developers to design, train, and deploy an iOS image classification app for waste categorization, promoting sustainable disposal practices.
- Implemented transfer learning techniques to optimize the model, achieving **98% accuracy** in classifying waste types.
- Oversaw project milestones, ensuring timely delivery and seamless integration of app features.