Prabhjyot Singh

prabhjyot045@gmail.com (647)643-4300 singh-prabhjyot Prabhjyot045 prab-singh.com

SUMMARY

Computer Engineering M.Eng. student at the University of Waterloo, specializing in Artificial Intelligence within Electrical & Computer Engineering. Hands-on experience spanning full-stack development, LLM-powered agentic systems, robotics firmware, and ethical reinforcement learning research. Consistent track record of shipping production-grade software and reproducible research artifacts in fast-paced industry and academic environments.

SKILLS

Programming & Software Development: Python, C/C++, JavaScript, TypeScript, R, Angular, NestJS, REST APIs, Docker, AWS (ECR, EC2, S3), Terraform, Redis, Auth0, JWT, GitHub Actions, CI/CD Pipelines, Frontend Development, Fullstack Development

AI/ML & Data Science: Data Analytics, SQL, R, PyTorch, TorchRL, TensorFlow, Keras, Scikit-Learn, Hugging Face, OpenAI APIs, Reinforcement Learning, Prompt Engineering, Jupyter Notebook, JAX

Robotics & Embedded Systems: FANUC/ABB Robotic Systems, KAREL, RTOS, Embedded Optimization, Vivado

WORK EXPERIENCE

Graduate Research Assistant - UWECEML Lab, *University of Waterloo* 10-2025 – Present | Waterloo, Canada
- Researching **ethical AI** within reinforcement learning (RL) environments on the Moral AI Systems team while defining experiment protocols and evaluation criteria.
- Building Craftax RL experiments and **JAX** training/evaluation pipelines for agent-behavior analysis and benchmarking.
- Developing a **Compute Canada**-compatible framework for scalable, reproducible ethical-AI experiments (configs, seeding, logging, batch runs)

Software Engineer - COOP, *BrainRidge Consulting* 05-2025 – 09-2025 | Toronto, Canada
- Designed and developed LLM-powered agents using **Sonnet 4**, implementing advanced **prompt engineering** and validation loops to prompt and re-prompt models until structured, reliable outputs were produced. Integrated these agents into a larger agentic framework, enabling autonomous task execution and significantly reducing manual intervention in workflow automation
- Built and deployed **scalable NestJS microservices** that allowed the front end to securely interface with external GitHub and Jira **REST APIs**, automating issue importing, repository interactions, and project interactions
- Architected and implemented a role-based user authentication and management system leveraging **Auth0, Redis, and JWT tokens**, enabling secure session handling, granular RBAC enforcement, and consistent authentication across distributed front-end and back-end services

Robotics Software Developer - COOP, *Lincoln Electric Automation* 09-2024 – 12-2024 | Waterloo, Canada
- Developed and optimized embedded firmware for **FANUC and ABB** robotic systems (TypeScript, C++, KAREL), enhancing free-motion recording functionality for a more intuitive user experience and improved real-time data capture
- Improved trajectory planning and motion control, reducing erratic robotic movement by **30%** and increasing overall operational stability
- Led a codebase refactoring initiative for the software development team, optimizing architecture and reducing the number of files by **20%**

Robotics Test Engineer - COOP, *Kindred AI* 01-2023 – 04-2023 | Toronto, Canada
- Designed and implemented a supervised learning model in **PyTorch** to dynamically adjust image brightness and contrast, reducing segmentation error from **30% to 10%** and significantly improving real-world perception accuracy
- Expanded automated test coverage to **95%** by identifying workflow gaps and developing new end-to-end test cases in **Python**, executed within a virtual simulation environment to ensure robust firmware validation
- Evaluated segmentation model performance under variable lighting conditions, uncovering a **30% error rate in low-light scenarios** and driving firmware calibration improvements for enhanced sensor reliability

PROJECTS

Aegis Lights , *Self Adaptive Systems Project* 10-2025 – 12-2025
- **Architected a self-adaptive infrastructure system** using a **MAPE-K feedback loop** (Monitor-Analyze-Plan-Execute-Knowledge) to optimize urban traffic signal phases in real-time.
- **Engineered a customized micro-simulation environment** by wrapping the **CityFlow** engine in a **Flask-based REST API** with thread-safe mutex locking to manage concurrent data streams and simulate artificial roadway incidents.
- **Implemented a Contextual Bandit algorithm** (utilizing Upper Confidence Bound) to dynamically select signal phases from a pre-validated library, balancing the exploration of new timing patterns with the exploitation of known low-congestion states.
- **Achieved a 45-49% reduction in average trip time** across low, medium, and high traffic scenarios by developing an incident-aware cost model that aggressively penalizes queue spillback and reroutes virtual traffic flows.

EDUCATION

MEng. Electrical & Computer Engineering, *University of Waterloo* 09-2025 – present | Waterloo, Canada
Master of Engineering, Electrical & Computer Engineering, Specialization in Artificial Intelligence & Machine Learning

BASc. Computer Engineering, *University of Waterloo* 09-2020 – 04-2025 | Waterloo, Canada
Bachelor of Applied Science, Computer Engineering, Honours, Co-operative Program, Artificial Intelligence Option