

Khalil Virji

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EDUCATION

McGill University

Montreal, QC

M.Sc. in Computer Science – supervised by Dr. Gregory Dudek

Sep 2022 – Jun 2024

- **Research:** Deep Learning, Robotics, Reinforcement Learning, Computer Vision, Planning & Navigation

B.Sc. in Mathematics and Computer Science

Sep 2017 – May 2022

EXPERIENCE

Machine Learning Researcher | University of California, Irvine

Irvine, CA

Python, PyTorch Lightning, NumPy

Jul 2024 – Present

- Advancing deep learning models to extend atmospheric predictability beyond 14 days
- Extending state-of-the-art models to better capture slow-moving atmospheric processes, aiming to improve long-range forecast stability
- Enabled distributed training of 1.2B+ parameter foundation weather models on limited hardware using memory-efficient data streaming and lightweight fine-tuning techniques (e.g., LoRA)

Robotics Researcher | McGill Mobile Robotics Lab

Montreal, QC

Python, C++, PyTorch, ROS2, Unity, Docker

Sep 2022 – Jun 2024

- Published research on robust perception and control methods for autonomous robots in real-world environments
- Built and deployed a robotic system for scuba diver following and recovery by fusing real-time object detection, tracking, and adaptive control, achieving 5+ minutes of continuous following in harsh open-ocean conditions
- Trained an autonomous vehicle to safely navigate unmapped forest environments by using a transformer network to predict future terrain conditions from visual input and candidate action sequences
- Transferred deep reinforcement learning control policies from simulation to physical robots, leveraging domain randomization and adversarial learning to ensure robust sim-to-real transfer

Lead Software Developer | Compost Montreal

Montreal, QC

JavaScript, HTML, CSS, Liquid, Shopify

Jun 2022 – Jun 2024

- Managed end-to-end storefront development, from feature implementation to site maintenance and troubleshooting
- Eliminated over 30% of recurring SaaS costs by replacing third-party services with in-house solutions
- Restructured bilingual marketing and optimized SEO localization for English- and French-speaking customers

Software Developer Intern | CloudOps

Montreal, QC

Java, Spring Boot, Vue.js, MySQL, Spock, Jest

May 2021 – Sep 2021

- Abstracted AWS, Azure, and GCP services into a unified platform to streamline multi-cloud data management

Web Developer Intern | Sensequake

Montreal, QC

JavaScript, HTML, CSS, Node.js, Express.js, jQuery, MongoDB

May 2020 – Sep 2020

- Cut data-visualization latency by over 50% by migrating the web platform from Django to Node.js
- Enabled real-time structural health monitoring by building web commands to communicate with vibration sensors

PROJECTS

Save a Minute | *JavaScript, HTML, CSS*

khalilv.github.io/saveamminute.html | 2024

- Built a web app to navigate optimal exit points in the Montreal metro system, helping users cut commute time
- Collected data from all 68 stations and created interactive visualizations to identify optimal boarding positions

RFID Touchless Checkout System | *Java, Arduino, UHF RFID Technology*

khalilv.github.io/rfid.html | 2020

- Engineered a system to scan entire grocery carts in a single pass, achieving 100% accuracy on carts up to 30 items
- Piloted the system in a hardware store with live inventory, validating feasibility under typical shopping conditions

Legends of Andor | *Java, XML, Spring Boot, Android Studio*

khalilv.github.io/legendsofandor.html | 2020

- Developed a multiplayer board game for Android devices with an in-game chat room as part of a 6-person team

PUBLICATIONS

Lotfi, F., **Virji, K.**, Faraji, F., Berry, L., Holliday, A., Meger, D., Dudek, G., *Uncertainty-aware hybrid paradigm of nonlinear MPC and model-based RL for offroad navigation*, **ICRA, 2024**. [DOI: 10.1109/ICRA57147.2024.10610452](https://doi.org/10.1109/ICRA57147.2024.10610452)

Lotfi, F., **Virji, K.**, Dudek, G., *Robust Scuba Diver Tracking and Recovery in Open Water Using YOLOv7, SORT, and Spiral Search*, **CRV 2023**. [DOI: 10.1109/CRV60082.2023.00037](https://doi.org/10.1109/CRV60082.2023.00037)