Andrew Holliday

+1 (514) 632 1337 • andrew.holliday@mail.mcgill.ca
aholliday.github.io andrew-holliday-b1948512 aholliday

Industrial Experience

Samsung AI Center **Montreal, QC**
Research Intern *2019*

- Developed and enhanced a visual localization algorithm for real-world outdoor and indoor environments using still images and videos
- Designed and ran experiments comparing the algorithm with existing methods, achieving superior accuracy in challenging conditions
- Utilized Python, PyTorch, and OpenCV for algorithm development and experimentation
- Published findings in a paper in the journal *Autonomous Robots*

Kinsol Research Inc. **Victoria, BC**
Machine Learning Consultant *2017-2019*

- Designed and implemented neural network architectures and training pipelines for visual object recognition and instance discrimination, time series prediction, and fast estimation of slow exact calculations
- Developed a dataset and annotation pipeline for training an object detection neural network, including the design of a human annotation process and clustering algorithm for final annotation refinement
- Maintained and improved a state-estimation system for tracking parking availability

National Institute of Informatics **Tokyo, Japan**
Research Intern / Team Lead *2016*

- Led a team of four graduate interns in developing a novel aerial image dataset and designing a model-distillation technique for semantic segmentation
- Managed the collection, annotation, and processing of the dataset
- Directed the writing and submission of a paper to *CVIU*, contributing significantly to the final document
- Developed a Caffe framework extension for multi-dataset deep network training and maintained the team's development servers

McGill University **Holetown, Barbados**
Student Participant *2016, 2017, 2022, 2023*

- Participated in four marine robotics field trials at Bellairs Research Institute in Barbados, supporting and leading experiments with surface and sub-surface robots.
- Developed code and maintained hardware for marine robots, ensuring operational readiness for field deployments.
- Managed hardware logistics on two trips as "packing czar," overseeing the packing and safe transport of all required robotics equipment.
- Served as team lead on one field trial, coordinating team efforts and deployment activities.

In Motion Technology **New Westminster, BC**
Software Developer *2011–2013*

- Performed requirements gathering, design, and development of applications and core functions of the onBoard Mobile Gateway, a rugged wireless router providing seamless VPN access for commercial and public vehicle fleets
- Maintained code for the onBoard Mobility Manager server, enabling efficient fleet management through a web interface
- Developed in C++, Java, and Python in a Linux environment

UBC **Vancouver, BC**
Research Assistant *2010*

- Worked with Professor Alan Wagner on a project applying data-mining techniques to large volumes of eBay transaction data, with the goal of developing a recommender system
- Wrote Python scripts and C programs to efficiently parse and manipulate multi-GB text datasets
- Designed and implemented a high-performance database system using Tokyo Cabinet to support large-scale data-mining as part of this project

Education

McGill University **Montreal, QC**
PhD, Computer Science *2017–Present*
- Thesis: Applications of Deep Reinforcement Learning to Urban Transit Network Design
- Supervised by Prof. Gregory Dudek and Prof. Ahmed El-Geneidy
- Committee members: Prof. Doina Precup, Prof. David Meger
- Expected completion: December 2024

McGill University **Montreal, QC**
M.Sc, Computer Science *2014–2017*
- Thesis: Object-Features for Localization under Extreme Scale Changes
- Supervised by Prof. Gregory Dudek
- Exchange term at the National Institute of Informatics

University of British Columbia **Vancouver, BC**
B.Sc, Double Major in Physics & Computer Science *2007–2011*

Publications

2024: **Andrew Holliday**, Gregory Dudek. "A Hybrid Neural-Evolutionary Algorithm for Autonomous Transit Network Design". Presented at *IEEE Conference on Robotics and Automation (ICRA)*, IEEE.

2024: Faraz Lotfi, Khalil Virji, Farnoosh Faraji, Lucas Berry, **Andrew Holliday**, David Meger, Gregory Dudek. "Uncertainty-aware hybrid paradigm of nonlinear MPC and model-based RL for offroad navigation: Exploration of transformers in the predictive model". Presented at *IEEE Conference on Robotics and Automation (ICRA)*, IEEE.

2023: **Andrew Holliday**, Gregory Dudek. "Augmenting Transit Network Design Algorithms with Deep Learning". Presented at *26th IEEE International Conference on Intelligent Transportation Systems (ITSC)*, pp. 2343-2350, IEEE.

2021: **Andrew Holliday**, Gregory Dudek. "Scale-Invariant Localization Using Quasi-Semantic Object Landmarks". In *Autonomous Robots*, vol. 45, no. 3, pp. 407-420

2020: **Andrew Holliday**, Gregory Dudek. "Pre-trained CNNs as Visual Feature Extractors: A Broad Evaluation". Presented at *17th Conference on Computer and Robot Vision (CRV)*, pp. 78-84, IEEE.

2018: **Andrew Holliday**, Gregory Dudek. "Scale-Robust Localization Using General Object Landmarks". *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, pp. 1688-1694, IEEE.

2018: Travis Manderson, **Andrew Holliday**, Gregory Dudek. "Gaze Selection For Enhanced Visual Odometry During Navigation". Presented at *15th Conference on Computer And Robot Vision (CRV)*, pp. 110-117, IEEE.

2017: **Andrew Holliday**, Mohammadamin Barekatain, Johannes Laurmaa, Chetak Kandaswamy, Helmut Prendinger. "Speedup of Deep Learning Ensembles for Semantic Segmentation Using a Model Compression Technique". In *Computer Vision and Image Understanding*, vol. 164, pp. 16-26.

Conference Presentations

ICRA 2024: "A Hybrid Neural-Evolutionary Algorithm for Autonomous Transit Network Design".

ITSC 2023: "Augmenting Transit Network Design Algorithms with Deep Learning".

CRV 2020: "Pre-trained CNNs as Visual Feature Extractors: A Broad Evaluation".

IROS 2018: "Scale-Robust Localization Using General Object Landmarks".

Teaching

McGill University **Montreal, Quebec**

Teaching Assistant *2014–2017*

- Performed teaching-assistant duties for COMP 202 (introduction to programming), COMP 208 (introduction to programming for engineers), COMP 273 (computer systems), and COMP 310 (operating systems)
- Graded assignments and exams
- Held office hours, graded assignments and exams, and gave tutorial lectures
- Received good TA reports from students, and earned a reputation as an excellent guide for difficult concepts

Awards & Fellowships

2020-2022: Graduate Excellence Award

2020: MES Perserverance Award

2020: Lorne Trottier Science Accelerator Fellowship

2019-2021: NSERC Postgraduate Scholarships-Doctoral Program (PGS-D) Award

Skills

Technical subjects: Convolutional Neural Nets, Graph Neural Nets, Reinforcement Learning, Supervised Learning, Field Robotics, Data Science

Coding Languages: Python, Rust, C/C++, Java; some experience with Haskell, Matlab, Prolog, Erlang

Libraries & Frameworks: PyTorch, PyTorch Geometric, NumPy, OpenCV, ROS

Other: Technical writing, conflict resolution

Other Details

- Chair of ITSC 2023 session on public transport modelling
- Reviewed for conferences from 2018 to present including CoRL, RSS, IROS, ITSC, and ICRA
- Student Fellow of the NSERC Canadian Robotics Network (NCRN)