Dmytro Humeniuk

Montreal, Quebec H3V 1G5 dmytro.humeniuk@polymtl.ca 514-238-9320 dgumenyuk.github.io

Summary

PhD candidate in Computer Engineering with a specialization in AI-driven robotic systems development. Skilled in robotics simulation, machine learning, deep learning, and reinforcement learning. Experienced in developing autonomous robotic systems using NVIDIA Isaac Sim and ROS 2, with a strong background in software engineering, optimization methods and vision-based perception systems. Experience in deploying machine learning models on edge devices, such as Nvidia Jetson, as well as in the cloud.

Skills

Languages: Python, Shell, SQL, C/C++, MATLAB
Libraries/Frameworks: PyTorch, TensorFlow, TAO Toolkit, Scikit-Learn, OpenAI Gym, Flask, Django, React, ROS 2, Isaac Sim
Tools: Git, Docker, Kubernetes, AWS, Azure, Google Cloud
Languages: English (fluent), French (fluent), Ukrainian (native), Russian (native)

Education

PhD in Computer Engineering, Polytechnique Montréal *Sep 2021 – Present*
GPA: 3.79/4
Research: AI Techniques for Simulation-Based Test Generation for Autonomous Robotic Systems, Supervisor: Prof. Foutse Khomh

Master of Applied Science in Computer Engineering, Polytechnique Montréal *Sep 2019 – Aug 2021*
Thesis: A Search-Based Framework for Automatic Generation of Testing Environments for Cyber-Physical Systems, Supervisor: Prof. Foutse Khomh

Bachelor Degree in Computer Engineering, Kyiv Polytechnic Institute *Sep 2015 – Jun 2019*
Final Project: Automated System for Determining Solar Cell Model Parameters

Experience

Research Intern, Sycodal, Montréal *May 2023 – Present*
- Developed a simulation-based testing framework for robotic manipulators in Nvidia Isaac Sim simulator.
- Authored a paper published at the Automated Software Engineering 2024 conference.

Teaching Assistant – Advanced Software Testing, Polytechnique Montréal *Jan 2024 – May 2024*
- Designed and implemented 5 assignments covering software testing topics, including fuzzing, search-based software testing, and large language model-based test generation.
- Presented the lab assignments, graded submitted labs for a group of 12 students.

Machine Learning Software Developer Intern, Ericsson, Montréal *Jan 2023 – Jun 2023*
- Implemented decentralized gradient descent algorithms using PyTorch and the BlueFog frameworks.
- Evaluated communication–computation trade-offs of various distributed gradient descent algorithms in a real-world 10-node network setup.

Teaching Assistant – Software Testing , Polytechnique Montréal *Sep 2022 – Dec 2022*
- Modified existing assignment templates to include assigments on Pytest framework, fuzzing, mutation and load testing as well as GitHub Actions pipelines.
- Presented the lab assignments, graded submitted labs for a group of 40 students.

Research Intern, COGECO, Montréal *Feb 2021 – Jun 2021*
- Collected, analyzed and visualized data on preventive maintenance of cable modem networks.
- Proposed an algorithm to predict equipment failures up to seven days in advance.

Teaching Assistant – Software Testing , Polytechnique Montréal *Sep 2020 – Dec 2020*

- Developed a Naïve Bayes anti-spam system for the purpose of educational exercises on software testing, including machine-learning based software testing.
- Authored 5 assignments on software testing, graded the submitted submitted assignments for a class of 45 students.

Research Assistant, Institute of Physics and Technology, Kyiv *Mar 2018 – Aug 2019*

- Developed automated semiconductor diode measurement system.
- Co-authored IEEE publication on thermal regime estimation of power LEDs.

Mitacs Globalink Intern, Laval University, Quebec *Jun 2018 – Aug 2019*

- Designed and manufactured energy harvesting system based on microbial fuel cells, including a user interface in Matlab.
- Co-authored a publication on bacterial energy recovery system.

Scholarships and Awards

- Merit Scholarship for Foreign Students (50 000 CAD) (PBEEE) *May 2024*
- FRQNT Doctoral Training Scholarship (50 000 CAD) *May 2024*
- CodeML Hackathon – 2nd place (CNN based model for plant disease prediction) *October 2023*
- Finalist, Human Competitive Awards (Humies) – GECCO conference *July 2022*
- CodeML Hackathon – 1st place (NLP model for language classification) *October 2022*
- Winner, SBST CPS Testing Competition (AmbieGen tool) *June 2022*

Selected Projects

- **AmbieGen** - an open-source Python-based library for optimization based search, adopted to autonomous robotic systems allowing to easily configure intelligent test generators. Available online: AmbieGen.
- **RILaST** - an open-source tool that enhances representation of given inputs for search algorithms by mapping it to the latent space of a variational autoencoder. Available online: RILaST.
- **RIGAA** - an open-source tool that leverages reinforcement learning to improve the initial population generation for the search algorithms . Available online: RIGAA.

Selected Publications

- D. Humeniuk, H. Ben Braiek, T. Reid, and F. Khomh. *In-Simulation Testing of Deep Learning Vision Models in Autonomous Robotic Manipulators.* In Proceedings of the 39th IEEE/ACM International Conference on Automated Software Engineering (ASE), 2024. DOI
- D. Humeniuk, F. Khomh, and G. Antoniol. *Reinforcement Learning Informed Evolutionary Search for Autonomous Systems Testing.* ACM Transactions on Software Engineering and Methodology (TOSEM), 2024. DOI
- D. Humeniuk, F. Khomh, and G. Antoniol. *AmbieGen: A Search-Based Framework for Autonomous Systems Testing.* Science of Computer Programming (SCP), 2023. DOI
- D. Humeniuk, F. Khomh, and G. Antoniol. *A Search-Based Framework for Automatic Generation of Testing Environments for CPS.* Information and Software Technology (IST), 2022. DOI

Other activities and Awards

- Member of the organizing committee of the international competition on autonomous drones testing *2024 - 2025*
- Montreal Summer School in Robotics 2022 participant *August 2022*
- IVADO/Mila Deep Learning School participant *March 2021*
- Public's Favorite Award, IVADO Digital October *October 2020*

- Mitacs Globalink Fellowship — *September 2019*
- Mitacs Research Internship Award — *May 2018*
- EUCYS 2015 in Milan, representing the Ukrainian delegation at the international competition for science and engineering projects — *September 2015*
- Presidential Scholarship of Ukraine for the 1st place in the National Engineering Competition — *June 2015*

Volunteer Activities

- Volunteer for the Ukrainian community. Organizing donation collection for VAC device for a hospital in Kyiv (3000 cad raised); member of the organizing committee for AI helps Ukraine conference — *February 2022 - present*
- Volunteer at "Entraide des Familles" food bank, Montreal (60+ hours) — *July 2020 - Sept 2021*