Dmytro Humeniuk

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Summary

PhD candidate in Computer Engineering with a specialization in black box optimization methods applied to robotics systems testing. 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 and optimization methods. Experience in deploying machine learning models on edge devices 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, 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 an search algorithm based testing framework for robotic manipulators in Nvidia Isaac Sim simulator.
- Designing pipelines for collecting synthetic datasets with Isaac Replicator. Design of control and computer vision algorithms for the execution of pick and place tasks with Kinova Link 6 and Flexiv Rison4s.
- 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. Code: AmbieGen. Paper: 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. Code: RILaST. Paper: RILaST
- **RIGAA** - an open-source tool that leverages reinforcement learning to improve the initial population generation for the search algorithms. Code: RIGAA. Paper: 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*