Postdoctoral fellowship positions in robotics and computer vision

Acceleration Consortium

Description

The AI and Automation Lab (robotics division) at the University of Toronto's Acceleration Consortium is hiring immediately. We are recruiting **two engineering postdocs** focused on robotics, computer vision, and machine learning for ChemDroid project. The positions are for **two years**, with a salary of up to $**90K CAD/year.** ChemDroid is a translation project to develop a robust and flexible vision-integrated robotics systems minimum viable product (MVP) and deploy them to chemistry and biology labs. This work will involve developing robust and safe robotics and computer vision algorithms and deployment to real chemistry and biology laboratories. In this role, you will be working at the interface of robotics, computer vision, using imitation learning, reinforcement learning, foundation model to do manipulation and reasoning to solve real world laboratory automation problems, contributing to the future of materials discovery.

The AI and Automation Lab is a research hub to develop AI tools and robotic automation hardware and methods for self-driving labs at the Acceleration Consortium. The robotics division works on robot manipulation, decision making, experimental planning, and computer vision.

Situated within the University of Toronto, one of the most productive research communities globally, this position provides access to extensive resources, including fully affiliated academic hospitals and research institutes. The Greater Toronto Area enhances this exceptional academic environment with its cultural and demographic diversity, as well as one of the highest standards of living in the world.

The two Acceleration Consortium postdocs are supervised by Staff Scientist Dr. Kourosh Darvish in the AI & Automation Lab with a direct reporting line to the ChemDroid scientific advisors Professor Alán Aspuru-Guzik, Florian Shkurti, and Animesh Garg and other stakeholders. You can find more information about our recent projects on our GitHub page: https://ac-rad.github.io/

Responsibilities

- Develop and deploy flexible and robust manipulation methods for lab automation tasks

- Develop and deploy flexible and robust decision-making methods for lab automation long horizon decision making and scheduling
- Develop and deploy 2D and 3D computer vision for various perception tasks and autonomous 3D reconstruction of lab setups
- Interaction with end users to support lab automation tasks
- Create computational, visualization, data collection tools and infrastructure for rapid development and deployment to various end users
- Increase the system usability by the end users
- Increase the system robustness
- Prepare and present findings in regular meetings with advisors and industry stakeholders
- Mentor junior lab members and promote a collaborative team environment

Additional Background

The Acceleration Consortium (AC) at the University of Toronto is leading a transformative shift in scientific discovery that will accelerate technology development and commercialization. The AC is a global community of academia, industry, and government that leverages the power of artificial intelligence, robotics, materials sciences, and high-throughput chemistry to create self-driving laboratories. These autonomous labs rapidly design materials and molecules needed for a sustainable, healthy, and resilient future, with applications ranging from renewable energy and consumer electronics to drugs. AC SDLs will advance the field of AI driven autonomous discovery and develop the materials and molecules required to address society's largest challenges, such as climate change, water pollution, and future pandemics.

The Acceleration Consortium promotes an inclusive research environment and supports the EDI priorities of the unit.

The Acceleration Consortium received a $200M Canadian First Research Excellence Grant for seven years to develop self-driving labs for chemistry and materials, the largest ever grant to a Canadian University.

The AC is developing seven advanced SDLs plus an AI and Automation lab:

- SDL1 - Inorganic solid-state compounds for advanced materials and energy
- SDL2 - Organic small molecules for sustainability and health
- SDL3 - Medicinal chemistry for improving small molecule drug candidates
- SDL4 - Polymers for materials science and biological applications
- SDL5 - Formulations for pharmaceuticals, consumer products, and coatings
- SDL6 - Biocompatibility with organoids / organ-on-a-chip Acceleration Consortium

- SDL7 - Synthetic scale-up of materials and molecules (University of British Columbia partner lab)

The ChemDroid project is in collaboration with SDL2 staff scientists Dr. Han Hao and Dr. Yang Cao as well as other AC SDLs.

Qualifications

Education:

- Ph.D. in robotics, computer science, or other related fields

Required Experience:

- Demonstrated experience in preparing and disseminating scientific findings to industry stakeholders, scientists, and the general public
- Strong academic ability, demonstrated through publications in top-tier journals, conferences, and patents
- Experience at least in one of the follow domains:
    - Robot manipulation
    - Long horizon decision making and reasoning
    - 2D and 3D Computer vision
    - Foundation models for robotics
    - Robotics data pipeline for collection, training, visualization, and deployment
    - Robotic simulation platforms (e.g., Isaac Sim, Isaac Lab, etc.)

Additional Desired Experience:

- 2 years of post-graduation experience either in academic or industrial research labs
- Experience at deployment to operational environments, industries, or startups
- Experience at chemistry, biology lab automation
- Experience at mechatronics, design, and 3D printing

Technical Skills:

- Proficiency in Python, C++, ROS, and additional scripting languages (SQL, MATLAB, etc.), software building and packaging Docker, Conda, CMake, setuptools, pip, and version control Git
- Proficiency in machine learning libraries such as Pytorch, Tensorflow, and Scikit-learn, RL-Games, SKRL, Stable Baselines3, robomimic
- Hands-on experience with real robotics system hardware

How to apply

The application package should include:

1. A cover letter describing your interest and qualifications
2. Your CV
3. A representative publication
4. Contact information for 3 references who have confirmed that they are willing to supply letters of reference upon request

To apply please fill out this form: https://forms.gle/dcw4YCSvypeimraw7

If you have any questions, please email Kourosh Darvish (kourosh.darvish@utoronto.ca), with the subject line "ChemDroid Robotics Application Question".

Evaluation of candidates will begin immediately and continue until it is filled.

Posting date: April 29, 2025

Closing date: May 31, 2025

The normal hours of work are 40 hours per week for a full-time postdoctoral fellow (pro-rated for those holding a partial appointment) recognizing that the needs of the employee's research and training and the needs of the supervisor's research program may require flexibility in the performance of the employee's duties and hours of work.

Employment as a Postdoctoral Fellow at the University of Toronto is covered by the terms of the CUPE 3902 Unit 5 Collective Agreement.

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The University of Toronto is strongly committed to diversity within its community and especially welcomes applications from racialized persons/persons of colour, women, Indigenous / Aboriginal People of North America, persons with disabilities, LGBTQ2S+ persons, and others who may contribute to the further diversification of ideas.