

# Sahand REZAEI-SHOSHTARI

## PhD Candidate in Computer Science

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| [sahandrez.github.io](https://github.com/sahandrez)

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### EDUCATION

Present Sep. 2020	PhD, SCHOOL OF COMPUTER SCIENCE, MCGILL UNIVERSITY, Montreal, Canada Supervisors : Doina Precup, David Meger CGPA : 4.00/4.00
Dec. 2019 Sep. 2017	Master of Engineering - Thesis, MCGILL UNIVERSITY, Montreal, Canada Supervisors : Inna Sharf, David Meger CGPA : 4.00/4.00 Thesis : Learning Manipulator Dynamics for Control and Interaction Inference
Sep. 2016 Sep. 2012	Bachelor of Mechanical Engineering, UNIVERSITY OF TEHRAN, Tehran, Iran Supervisor : Masoud Shariat Panahi CGPA : 3.98/4.00 Thesis : Online Path Planning for a Mobile Robot in Dynamic Environments using Reinforcement Learning

### WORK EXPERIENCE

Sep. 2020 Mar. 2020	Research Intern, SAMSUNG AI CENTRE, Montreal, Canada <ul style="list-style-type: none"><li>&gt; Multimodal generative modeling for learning intuitive physics using the senses of touch and vision</li><li>&gt; Development of a visuotactile simulator for robotic manipulation in PyBullet</li><li>&gt; Deep reinforcement learning for load balancing of 5G networks</li></ul>
Mar. 2020 Jan. 2020	AI Programmer, UBISOFT LA FORGE, Montreal, Canada <ul style="list-style-type: none"><li>&gt; Deep reinforcement learning for automated video game testing</li><li>&gt; Development of a video game environment in Unity3D for navigation in complex 3D environments</li></ul>
Aug. 2019 Mar. 2019	Research Intern, SAMSUNG AI CENTRE, Montreal, Canada <ul style="list-style-type: none"><li>&gt; Object detection neural networks for human hand-wave motion detection</li><li>&gt; Development of the vision stack on-board of a mobile robot using Google Edge TPU</li></ul>
Apr. 2019 Sep. 2017	Teaching Assistant, MCGILL UNIVERSITY, Montreal, Canada <ul style="list-style-type: none"><li>&gt; Courses : System Dynamics and Control, Numerical Methods, Machine Element Design</li></ul>

### PUBLICATIONS

- 2021 Rezaei-Shoshtari, S., Hogan, F.R., Jenkin, M., Meger, D. and Dudek, G., 2021, May. "Learning Intuitive Physics with Multimodal Generative Models". In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 35, No. 7, pp. 6110-6118).
- 2021 Hogan, F.R., Jenkin, M., Rezaei-Shoshtari, S., Girdhar, Y., Meger, D. and Dudek, G., 2021. "Seeing Through your Skin : Recognizing Objects with a Novel Visuotactile Sensor". In *Proceedings of the IEEE/CVF Winter Conference on Applications of Computer Vision* (pp. 1218-1227).
- 2020 Rezaei-Shoshtari, S., Meger, D. and Sharf, I., 2020. "Learning the Latent Space of Robot Dynamics for Cutting Interaction Inference". In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 5627-5632). IEEE.
- 2020 Molamohammadi, M., Rezaei-Shoshtari, S. and Qitoriano, N., 2020. "Jacobian of generative models for sensitivity analysis of photovoltaic device processes". In *Machine Learning for Engineering Workshop at NeurIPS* (Vol. 2020).
- 2019 Rezaei-Shoshtari, S., Meger, D. and Sharf, I., 2019, November. "Cascaded gaussian processes for data-efficient robot dynamics learning". In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)* (pp. 6871-6877). IEEE.

### HONORS AND AWARDS

2020 – date	DeepMind Grad Award (\$25000/yr), DeepMind and McGill University
Nov. 2019	IROS Student and Developing Countries (SDC) Travel Award (\$800), IEEE/RSJ IROS 2019
2017 – 2018	Grad Excellence Award (\$5000) in Mechanical Engineering, McGill University
Jul. 2012	National University Entrance Exam, Ranked 19 <sup>th</sup> , Iran

## SKILLS

Programming	Python, C++, C#, MATLAB, Simulink
Machine Learning Frameworks	PyTorch, TensorFlow, GPyTorch, Jax, GPFlow
Platforms	ROS, Docker
Robotic Software	Mujoco, Bullet, Gazebo, MoveIt!, RViz, OpenCV
Other Software	Unity 3D, SolidWorks, <del>ETX</del>

## SELECT PROJECTS

### MULTIMODAL GENERATIVE MODELING AND VISUOTACTILE SIMULATION 2020

 [github.com/SAIC-MONTREAL/multimodal-dynamics](https://github.com/SAIC-MONTREAL/multimodal-dynamics)  [Webpage](#)

- > Multimodal generative modeling for learning intuitive physics using the senses of touch and vision
- > Development of a visuotactile simulator for robotic manipulation in PyBullet.

### GYM FOREST FIRE 2020

 [github.com/sahandrez/gym\\_forestfire](https://github.com/sahandrez/gym_forestfire)

- > Fully-vectorized forest fire simulation based on cellular automaton for tackling wildfires with reinforcement learning.
- > With OpenAI Gym interface and an implementation of TD3 with CNN actor and critic.

### CONTROL AND MOTION PLANNING UTILITIES FOR KINOVA JACO 2 ROBOT 2018-2019

 [github.com/sahandrez/jaco\\_control](https://github.com/sahandrez/jaco_control)

- > Developed a ROS package for Kinova Jaco 2 robot with unified interface for the real and simulated robot.
- > Implemented impedance control, feedforward torque control, and velocity control utilities.
- > Implemented motion planning utilities for joint space and Cartesian space planning.

### RLBASE : IMPLEMENTATIONS OF RL ALGORITHMS 2019

 [github.com/sahandrez/rlbase](https://github.com/sahandrez/rlbase)  [Blog Post](#)

- > Minimalistic Deep RL implementations as an educational resource.
- > Fork of OpenAI Spinning Up with additional algorithms.

### LEARNING QUADROTOR CONTROLS USING DATA-EFFICIENT MODEL-BASED REINFORCEMENT LEARNING 2017

 [github.com/sahandrez/quad\\_pilco](https://github.com/sahandrez/quad_pilco)  [Simulation Videos](#)

- > Implemented PILCO (Probabilistic Inference for Learning Control) on a quadrotor to learn the control policies under the loss of an actuator.
- > Successfully learned to hover with only three actuators.

## COURSES

IFT 6135	Representation Learning, Université de Montréal - 4.30/4.30
IFT 6760	Reinforcement Learning and Optimal Control, Université de Montréal - 4.30/4.30
COMP 766	Probabilistic Graphical Models, McGill University - 4.00/4.00
COMP 765	Intelligent Robotics, McGill University - 4.00/4.00
COMP 558	Fundamentals of Computer Vision, McGill University - 4.00/4.00

## CERTIFICATIONS

Mar. 2021	ANITI Reinforcement Learning Virtual School (RLVS) 2021, Virtual
Oct. 2020	Simons Institute Mathematics of Online Decision Making Workshop, Virtual
Aug. 2019	CIFAR Deep Learning and Reinforcement Learning (DLRL) Summer School, Edmonton, Canada

## EXTRACURRICULAR ACTIVITIES

Oct. 2021 – date	Volunteer, Afghan Women's Centre of Montreal, Montreal, Canada
Sep. 2019	Volunteer, 2019 Montreal AI Symposium, Montreal, Canada
May 2019	Volunteer, 2019 IEEE International Conference on Robotics and Automation (ICRA), Montreal, Canada
Jan. 2017	Instructor, Workshop on the Industrial Applications of Optimization Methods, University of Tehran, Iran