

# Sahand REZAEI-SHOSHTARI

## PhD Student in Computer Science

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sahandrez.github.io

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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

Aug. 2023 May. 2023	Research Intern, MICROSOFT RESEARCH AI4SCIENCE, Amsterdam, The Netherlands ‣ Deep reinforcement learning for chemical reactions discovery
Feb. 2023 Apr. 2022	Research Intern, SAMSUNG AI CENTER, Montreal, Canada ‣ Meta imitation learning and meta reinforcement learning for continuous control and robotics
Sep. 2020 Mar. 2020	Research Intern, SAMSUNG AI CENTER, Montreal, Canada ‣ Multimodal generative modeling for learning intuitive physics using the senses of touch and vision ‣ Deep reinforcement learning for load balancing of 5G networks
Mar. 2020 Jan. 2020	AI Programmer, UBISOFT LA FORGE, Montreal, Canada ‣ Deep reinforcement learning for automated video game testing
Aug. 2019 Mar. 2019	Research Intern, SAMSUNG AI CENTER, Montreal, Canada ‣ Object detection neural networks for human hand-wave motion detection

### PUBLICATIONS - CONFERENCES

- 2022 Rezaei-Shoshtari, S., Morissette, C., Hogan, F.R., Dudek, G. and Meger, D., 2023. "Hypernetworks for Zero-shot Transfer in Reinforcement Learning". In *Proceedings of the AAAI Conference on Artificial Intelligence* (Vol. 37).
- 2022 Rezaei-Shoshtari, S., Zhao, R., Panangaden, P., Meger, D. and Precup, D., 2022. "Continuous MDP Homomorphisms and Homomorphic Policy Gradient". In *Advances in Neural Information Processing Systems (NeurIPS)*. 2022.
- 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.

## PUBLICATIONS - JOURNALS

- 2024 Panangaden, P.\*, **Rezaei-Shoshtari, S.\***, Zhao, R.\*, Meger, D. and Precup, D., 2023. "Policy Gradient Methods in the Presence of Symmetries and State Abstractions". *Journal of Machine Learning Research (JMLR)*. 2024.

## SELECT HONORS AND AWARDS

- 2022 – Present Canada Graduate Scholarship-Doctoral (CGS-D) Award. Amount of \$105,000. NSERC.  
2022 – Present Fonds de Recherche du Quebec - Nature et Technologies (FRQ-NT) Award. Amount of \$70,000. FRQ.  
2022 – Present Grad Excellence Award. Amount of \$7,000 per year. McGill University.  
2022 AAIL Student Scholarship Program. AAIL 2023.  
2022 NeurIPS 2022 Outstanding Reviewer (Top 8%). NeurIPS.  
2022 ICML 2022 Outstanding Reviewer (Top 10%). ICML.  
2020 – 2021 DeepMind Grad Award. Amount of \$25,000. DeepMind and McGill University.  
Nov. 2019 IROS Student and Developing Countries (SDC) Travel Award. Amount of \$800. IEEE/RSJ IROS 2019.  
2017 – 2018 Grad Excellence Award. Amount of \$5,000. 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, Unity 3D, Bullet, Gazebo, MoveIt, RViz, OpenCV

## SELECT PROJECTS




### CONTEXTUAL DEEPMIND CONTROL SUITE 2022

-  Paper  [github.com/SAIC-MONTREAL/contextual-dm-control](https://github.com/SAIC-MONTREAL/contextual-dm-control)  
> Implemented a series of contextual MDPs based on DeepMind Control Suite.

### DEEP HOMOMORPHIC POLICY GRADIENT ALGORITHMS 2022

-  Paper  Webpage  [github.com/sahandrez/homomorphic\\_policy\\_gradient](https://github.com/sahandrez/homomorphic_policy_gradient)  
> Extended the theory of MDP homomorphism to continuous states and actions.  
> Derived the novel homomorphic policy gradient theorem.  
> Proposed a novel algorithm for state-action abstraction and representation learning in deep RL.


### MULTIMODAL GENERATIVE MODELING AND VISUOTACTILE SIMULATION 2020

-  Paper  Webpage  [github.com/SAIC-MONTREAL/multimodal-dynamics](https://github.com/SAIC-MONTREAL/multimodal-dynamics)  
> Multimodal generative modeling for learning intuitive physics using the senses of touch and vision.  
> Developed 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 OpenAI Gym forest fire simulation based on cellular automaton for tackling wildfires with RL.

### 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, torque control, velocity control, and motion planning utilities.

## SELECT 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

## CERTIFICATIONS

- Apr. 2023 Trustworthy and Responsible AI Learning (TRAIL), Mila, Montreal, Canada  
Oct. 2020 Simons Institute Mathematics of Online Decision Making Workshop, Virtual  
Aug. 2019 CIFAR Deep Learning and Reinforcement Learning (DLRL) Summer School, Edmonton, Canada