Sahand Rezaei-Shoshtari
PhD Candidate in Computer Science

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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 ❯ Multimodal generative modeling for learning intuitive physics using the senses of touch and vision ❯ Development of a visuotactile simulator for robotic manipulation in PyBullet ❯ 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 ❯ Development of a video game environment in Unity3D for navigation in complex 3D environments
Aug. 2019 Mar. 2019	Research Intern, Samsung AI Centre, Montreal, Canada ❯ Object detection neural networks for human hand-wave motion detection ❯ Development of the vision stack on-board of a mobile robot using Google Edge TPU
Apr. 2019 Sep. 2017	Teaching Assistant, McGill University, Montreal, Canada ❯ **Courses :** System Dynamics and Control, Numerical Methods, Machine Element Design

🎓 Publications

2022	**Rezaei-Shoshtari, S.**, Meger, D. and Precup, D., 2022. "Homomorphic Policy Gradient Algorithms". *Under Review*.
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 Quitoriano, 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

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.
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 19th. 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, LaTeX

🖥 SELECT PROJECTS

MULTIMODAL GENERATIVE MODELING AND VISUOTACTILE SIMULATION   2020
🖸 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
  › 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
  › 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   ↗ 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   ↗ 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