Sahand Rezaei-Shoshtari

AI | Robotics Researcher

@ sahand.rezaei-shoshtari@mail.mcgill.ca
sahandrez.github.io
github.com/sahandrez
linkedin.com/in/sahand-rezaei
Montreal, Canada

Education

Sep. 2024 – Sep. 2020 | **PhD, School of Computer Science, McGill University, Montreal, Canada**
Supervisors : David Meger, Doina Precup
Thesis : Hierarchical Reinforcement Learning

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

Present – Mar. 2020 | **Research Intern, Samsung AI Centre, Montreal, Canada**
› Deep reinforcement learning for 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 Centre, Montreal, Canada**
› Worked on object detection neural networks for human hand-wave motions
› Implemented 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

2020 **Rezaei-Shoshtari, Sahand** and Meger, David and Sharf, Inna. "Learning the Latent Space of Robot Dynamics for Cutting Interaction Inference". In *2020 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, 2020.

2019 **Rezaei-Shoshtari, Sahand** and Meger, David and Sharf, Inna. "Cascaded Gaussian Processes for Data-efficient Robot Dynamics Learning". In *2019 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*. IEEE, 2019.

Certifications

Aug. 2019 **Deep Learning and Reinforcement Learning Summer School** in Edmonton, Canada

Skills

Programming	**Python**, **C++**, **C#**, **MATLAB**, Simulink
Machine Learning Frameworks	**PyTorch**, **TensorFlow**, **GPyTorch**, GPFlow
Platforms	**ROS**, **Docker**
Robotic Software	**Gazebo**, **MoveIt!**, **RViz**, **OpenCV**, Bullet
Other Software	**Unity 3D**, **SolidWorks**, LaTeX, **Microsoft Project**

Select Projects

Learning the Latent Space of the Dynamics of a Robotic Manipulator using Deep Generative Models — 2019

- Implemented Variational Autoencoders for learning the latent space of the dynamics of a robotic manipulator
- Used the latent space to infer the interactions of the robot and draw predictions for its future states
- Collected a dataset of real robotic cutting interactions and evaluated the framework in the context of robotic cutting

Cascaded Gaussian Processes for Data-efficient Robot Dynamics Learning — 2018-2019

IROS 2019 Paper IROS 2019 Video

- Developed cascaded Gaussian processes to learn the dynamics of a robotic manipulator in a fashion that respects our knowledge of the underlying topology of the system
- Evaluated the proposed method for controlling a robotic manipulator using model-based torque controllers
- Obtained better data and learning efficiency compared to standard methods

Learning Quadrotor Controls Using Data-Efficient Model-based Reinforcement Learning — 2017

github.com/sahandrez/quad_pilco Simulation Videos Report

- 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

Motion Planning and Control Utilities for Kinova Jaco 2 Robot — 2017-2018

github.com/sahandrez/jaco_control

- Worked on the full stack of Kinova Jaco 2 robot
- Implemented impedance control, feedforward torque control, and velocity control utilities
- Implemented motion planning utilities for joint space and Cartesian space planning

Design, Fabrication and Control of a Rotary Stewart Platform — 2016

- Designed and modelled a fully-functional Stewart platform in a team of 4
- Fabricated the robot with CNC Plastic machining
- Solved the inverse kinematics and controlled the robot using LabView

Honors and Awards

Nov. 2019	IROS Student and Developing Countries (SDC) Travel Award ($600), IEEE/RSJ IROS 2019
2017-2018	Grad Excellence Award ($5000) in Mechanical Engineering, McGill University
2015-2016	Faculty of Engineering Award, Ranked **2nd**, University of Tehran
2014-2015	Faculty of Engineering Award, Ranked **3rd**, University of Tehran
2012-2012	Nationwide University Entrance Exam, Ranked **19th**, Iran

Extracurricular Activities

Sep. 2019	**Volunteer, 2019 Montreal AI Symposium** in Montreal, Canada
May 2019	**Volunteer, 2019 IEEE International Conference on Robotics and Automation (ICRA)** in Montreal, Canada

References

References available upon request.