Sahand Rezaei-Shoshtari

AI | Robotics Researcher

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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 *2019 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.