Ritvik Singh

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Education

University of Toronto Toronto, Canada
BASc Engineering Science - Machine Intelligence 2019 - 2024
- GPA: 3.96/4.00

Employment

NVIDIA Deep Learning Engineer | Santa Clara, USA 2024.06 - Present
- Working on end-to-end control for dexterous manipulation.
- Collaborating with Dr. Ankur Handa, Dr. Karl Van Wyk, and Dr. Nathan Ratliff.

NVIDIA Deep Learning Engineering Intern | Toronto, Canada 2023.05 - 2024.05
- Large-scale synthetic data generation for robotics pose estimation.
- 3D vision leveraging diffusion models and a custom differentiable PBR renderer for material generation.

NVIDIA Deep Learning Engineering Intern | Toronto, Canada 2022.01 - 2022.12
- Scaled up synthetic data generation for in-hand manipulation.
- Worked on Omniverse Replicator and developing synthetic data pipelines for robotics and computer vision.

PAIR Lab Undergraduate Student | Toronto, Canada 2020.09 - 2022.12
- Worked with Professor Animesh Garg on hand pose estimation, teleoperation, and developing low-level robot control libraries for the Franka arm and Allegro hand.

Publications

1. **R. Singh**, J.Liu, J. Lafleche, K. Van Wyk, Y. Chao, N. Ratliff, and A. Handa, Synthetica: Large Scale Synthetic Data Generation for Robot Perception, *Preprint*
2. A. Handa, A. Allshire, V. Makoviychuk, A. Petrenko, **R. Singh**, J. Liu, D. Makoviichuk, K. Van Wyk, A. Zhurkevich, B. Sundaralingam, Y. Narang, J. Lafleche, D. Fox, and G. State, DeXtreme: Transfer of Agile In-hand Manipulation from Simulation to Reality, *ICRA* 2023
3. M. Mittal, C. Yu, Q. Yu, J. Liu, N. Rudin, D. Hoeller, J. Lin Yuan, **R. Singh**, Y. Guo, H. Mazhar, A. Mandlekar, B. Babich, G. State, M. Hutter, and A. Garg, ORBIT: A Unified Simulation Framework for Interactive Robot Learning Environments, *RA-L* 2023
4. D. Turpin, T. Zhong, S. Zhang, G. Zhu, J. Liu, **R. Singh**, E. Heiden, M. Macklin, S. Tsogkas, S. Dickinson, and A. Garg, Fast-Grasp'D: Dexterous Multi-finger Grasp Generation Through Differentiable Simulation, *Arxiv*

Patents

1. Training machine learning models using simulation for robotics systems and applications, US18448049

Projects

Robot Hand+Arm Dexterous Teleoperation

Real-world dexterous teleoperation of a robot hand+arm system using the hand pose regressed from a single monocular camera. Enables real-time control with kinematic retargetting for the hand and RMP control for the arm to ensure smooth and safe trajectories.

Robot Control Suite

Created a custom, lightweight library for real-time control of the Franka Panda and Allegro Hand.

Lox CPP

A C++ port of the JLox programming language supporting variable assignment, looping statements, and conditional control flow.