Jason Jingzhou Liu

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Education

- **Carnegie Mellon University** *Aug 2024 - Present*
  Ph.D in Robotics Pittsburgh, USA
  - Advised by Prof. Deepak Pathak and Prof. Ruslan Salakhutdinov (GPA: 4.0/4.0)

- **University of Toronto** *Sep 2019 - Apr 2024*
  Bachelor of Applied Science in Engineering Science, Robotics Major Toronto, Canada
  - Rank 1/250 (GPA: 3.98/4.0)

Publications

[1] **J.J. Liu***, J. Yang*, Y. Li, Y. Khaky, K. Shaw, D. Pathak. "Deep Reactive Policy: Learning Reactive Manipulator Motion Planning for Dynamic Environments". *Conference on Robot Learning (CoRL), 2025*.

[2] **J.J. Liu***, Y. Li*, K. Shaw, T. Tao, R. Salakhutdinov, D. Pathak. "FACTR: Force-Attending Curriculum Training for Contact-Rich Policy Learning". *Robotics: Science and Systems (RSS), 2025*.

[3] T. Tao*, M. Srirama*, **J.J. Liu**, K. Shaw, D. Pathak. "DexWild: Dexterous Human Interactions for In-the-Wild Robot Policies". *Robotics: Science and Systems (RSS), 2025*.

[3] R. Singh, **J.J. Liu**, K. V. Wyk, Y. Chao, J. Lafleche, F. Shkurti, N. Ratliff, A. Handa. "Synthetica: Large Scale Synthetic Data Generation for Robot Perception". *International Conference on Intelligent Robots and Systems (IROS), 2025*.

[4] Q. Yu*, M. Moghani*, K. Dharmarajan, V. Schorp, W. Panitch, **J.J. Liu**, K. Hari, H. Huang, M. Mittal, K. Goldberg, A. Garg. "ORBIT-Surgical: An Open-Simulation Framework for Accelerated Learning Environments in Surgical Autonomy". *International Conference on Robotics and Automation (ICRA), 2024*.

[5] S. Zhang*, Y. Qiao*, G. Zhu*, E. Heiden, D. Turpin, **J.J. Liu**, M. C. Lin, M. Macklin, A. Garg. "HandyPriors: Physically Consistent Perception of Hand-Object Interactions with Differentiable Priors". *International Conference on Robotics and Automation (ICRA), 2024*.

[6] A. Handa*, A. Allshire*, V. Makoviychuk*, A. Petrenko*, R. Singh*, **J.J. Liu***, D. Makoviichuk, K. V. Wyk, A. Zhurkevich, B. Sundaralingam, Y. Narang, J. Lafleche, D. Fox, G. State. DeXtreme: Transfer of Agile In-hand Manipulation from Simulation to Reality. *International Conference on Robotics and Automation (ICRA), 2023*.

[7] D. Turpin, T. Zhong, S. Zhang, G. Zhu, **J.J. Liu**, R. Singh, E. Heiden, M. Macklin, S. Tsogkas, S. Dickinson, A. Garg. "Fast-Grasp'D: Dexterous Multi-finger Grasp Generation Through Differentiable Simulation". *International Conference on Robotics and Automation (ICRA), 2023*.

[8] M. Attarian, M. Asif, **J.J. Liu**, R. Hari, A. Garg, I. Gilitschenski, J. Tompson. "Geometry Matching for Multi-Embodiment Grasping". *Conference on Robot Learning (CoRL), 2023*.

[9] M. Mittal, C. Yu, Q. Yu, **J.J. Liu**, N. Rudin, D. Hoeller, J. L. Yuan, R. Singh, Y. Guo, H. Mazhar, A. Mandlekar, B. Babich, G. State, M. Hutter, A. Garg. "Orbit: A unified simulation framework for interactive robot learning environments". *Robotics and Automation Letters (RA-L), 2023*.

Experience

- **NVIDIA** *May 2025 - Aug 2025*
  Research Scientist Intern
  - Worked on reinforcement learning for fine-tuning BC policies for dexterous, long-horizon manipulation.
  - Advised by Nathan Ratliff, Ankur Handa, and Karl Van Wyk.

- **Robot Vision and Learning Lab, University of Toronto** *Sep 2023 - Apr 2024*
  Undergraduate Researcher with Prof. Florian Shkurti
  - Completed undergraduate thesis on large-scale RL for manipulator collision-free motion planning.
  - Achieved SOTA learning-based motion planning results via training RL in Isaac Gym with Geometric Fabrics in procedurally generated obstacle environments with novel scene conditioning method (video).

- **NVIDIA** *Jan 2022 - Aug 2023*
  Robotics Simulation and Deep Learning Intern (Isaac Gym Team)
  - **In-Hand Manipulation**: Co-first authored DeXtreme, demonstrating human-level dexterity on anthropomorphic robot hands with large-scale RL and sim-to-real transfer. Implemented a pipeline to generate 20 mil + simulated images and trained Mask-RCNN object pose estimation for the RL policy.

- **Object Detection**: Co-authored Synthetica, achieving SOTA object-detection via training on large-scale simulation images, accepted to IROS 2025. Led the synthetic image generation pipeline (20 mil+ images). Achieved first-place on the BOP object-detection leader board.
- **RL Training**: Co-led OmniverseIsaacGymEnvs, a collection of 10+ RL robotic tasks in simulation (manipulation, locomotion tasks, etc.). The codebase has 990+ stars and 231+ forks on GitHub.
- **Simulation Development**: Core developer of Isaac Sim. Main contributions include 30× the max number of vectorized environments in simulation (from 500 to 16000), increased RL training speed by 10×, leading the development of physics-based domain randomization APIs for RL. I also led the development of URDF Importer and MJCF Importer for loading simulation assets in Isaac Sim.

- **Vector Institute** *Jan 2022 - Aug 2023*
  Robotics Researcher with Prof. Animesh Garg
  - **Robotics Simulation**: Co-authored and core developer of Orbit (later renamed to Isaac Lab), a unified simulation framework for robot learning, accepted to RA-L. Implemented IK, OSC, RMPFlow, and various RL environments in simulation. Performed sim-to-real experiments with a robot arm-hand setup.
  - **Dexterous Teleoperation**: Led the development of one of the first vision-based robotic hand-arm teleoperation system (video). Pipeline includes a robust, real-time, RGB-based hand-pose estimator, kinematic retargeting optimization, and reactive task-space motion controllers on the real robot.
  - **Dexterous Grasp Generation**: Co-authored Fast-Grasp'D, a grasp generator for multi-fingered robotic hands via differentiable simulation, accepted to ICRA 2023. Performed sim-to-real experiments using a hand-arm system to perform grasping.

Honors and Awards

- **Best Paper Award** *Jun 2025*
  EgoAct Workshop, RSS 2025
- **W.S. Wilson Medal** *May 2024*
  University of Toronto
  - Awarded for graduating first in class at the University of Toronto Engineering.
- **Best Undegraduate Thesis** *Apr 2024*
  University of Toronto
  - Awarded to a final year Engineering Science student whose thesis demonstrates exceptional innovation.
- **Engineering Science Award of Excellence** *Apr 2024*
  University of Toronto
  - Awarded for achieving a cGPA of 3.9/4.0 or higher in the Engineering Science program.
- **Charles Edwin Trim Scholarship** *Aug 2023*
  University of Toronto
  - Awarded based on academic excellence.
- **Dharma Master Chuk Mor Memorial Scholarship** *Aug 2022*
  University of Toronto
  - Awarded based on academic excellence.
- **Sullivan Memorial Scholarship** *Aug 2021*
  University of Toronto
  - Awarded based on academic excellence.
- **Shaw Scholarship** *Aug 2020*
  University of Toronto
  - Awarded to one student of Engineering Science who demonstrates high academic achievement, leadership skills, and design capabilities.
- **C. David Naylor University Scholarship** *Aug 2019*
  University of Toronto
  - Awarded to 10 students based on academic merit and demonstrated leadership excellence.

Technical Skills

- **Robotics:** Simulation (Isaac Sim/Gym, Pybullet, etc.), Sim-to-Real, Advanced Controls (Geometric Fabrics, RMP, OSC, Whole Body Control, etc.), Motion Planning, State Estimation (Kalman Filter, SLAM, etc.)
- **Machine Learning:** RL (PPO, etc.), Behavior Cloning (ACT, VLA, etc.), Transformers, Flow Matching, etc.
- **Software:** C++, C, Python (PyTorch, JAX, ROS, etc.),
- **Mechanical:** SOLIDWORKS (CSWP), 3D Printing