

Hongtao Wu

Curriculum Vitae

+1 (443)469-5311
✉ hongtaowu95@outlook.com
📁 hongtaowu67.github.io

Education

- 2019–present **Ph.D. Candidate**, *Mechanical Engineering*, Johns Hopkins University, Baltimore, MD.
2017-2019 **M.S.E.**, *Robotics*, Johns Hopkins University, Baltimore, MD.
2013-2017 **B.Eng**, *Power Engineering*, Beihang University, Beijing, China.

Publications

* indicates equal contribution

1. *W. Liu, ***H. Wu**, G. Chirikjian, "LSG-CPD: Coherent Point Drift with Local Surface Geometry for Point Cloud Registration." *ICCV 2021* [PDF](#)
2. **H. Wu** and G. Chirikjian, "Can I Pour into It? Robot Imagining Open Containability Affordance of Previously Unseen Objects via Physical Simulations." *IEEE Robotics and Automation Letter (RA-L) with ICRA 2021* [PDF](#) [Website](#) [Video](#) [Code](#) [Data](#)
Finalist for Best Paper Human-Robot Interaction
3. A. Hundt, B. Killeen, N. Greene, **H. Wu**, H. Kwon, C. Paxton, G. Hager, "'Good Robot!': Efficient Reinforcement Learning for Multi-Step Visual Tasks with Sim to Real Transfer." *IEEE Robotics and Automation Letter (RA-L) with IROS 2020* [PDF](#) [Code](#) [Video](#)
4. **H. Wu**, D. Misra, G. Chirikjian, "Is That a Chair? Imagining Affordances Using Simulations of an Articulated Human Body." *ICRA 2020* [PDF](#) [Website](#) [Video](#)
5. **H. Wu**, J. Mu, D. Ting, M. Xu, R. Taylor, I. Lordachita, G. Chirikjian, "Multi-Mosquito Object Detection and 2D Pose Estimation for Automation of PfSPZ Malaria Vaccine Production." *CASE 2019* [PDF](#)

Experiences

- Spring 2021 **Research Engineer, National University of Singapore**
Advisor: G. Chirikjian, Project: Robot Imagination
- Fall 2019 **Teaching Assistant, Johns Hopkins University**
Machine Learning: Deep Learning
- Spring 2019 **Teaching Assistant, Johns Hopkins University**
Robot Motion Planning
- Summer 2018 **Research Intern, SenseTime**
Developed a variational autoencoder-based CNN architecture for autonomous driving policy of a remote control car (SenseRover).

Skills

Python, C++, Matlab, ROS, Pytorch, Tensorflow, Ubuntu/Linux

Projects

2019-present **Interactive-based Robot Perception and Imagination**

Developed an object classification + affordance reasoning algorithm which classifies the object based on the function of the object in addition to the appearance to endow robot with a more intelligent understanding of the object.

2020-2021 **Probabilistic Point Cloud Registration**

Co-lead a project on developing an accurate and efficient point cloud registration algorithm robust to outlier, noise, and missing points. Use Lie group theory to develop an efficient parallelizable optimization framework for EM algorithm to get the registration solution.

2019 **Reinforcement Learning for Multi-Step Visual Tasks with Sim-to-Real Transfer**

Co-developed a reinforcement learning algorithm which efficiently learns multi-step block manipulation tasks in both simulation and real-world experiment. Set up the real-robot environment for clearing toys by pushing and grasping and stacking blocks tasks.

2018-2019 **Multi-Mosquito Body Part Detection**

Developed a multi-mosquito detection algorithm based on Mask R-CNN for malaria vaccine batch production. Developed a keypoint detection algorithm based on DeepLabCut to detect the pose of the mosquito.

May 2019 **Surgical Instrument and Anatomy Segmentation of Endoscope Videos (Course)**

Implemented multiple semantic segmentation algorithms for surgical instrument and anatomy segmentation of endoscope videos recorded by the da Vinci Xi system based on DeepLabv3+ and U-Net.

May 2019 **Nonlinear Control and Planning of Car-like Robot (Course)**

Trajectory generation for a car-like robot in environments with obstacles. Used Minkowski Sum to calculate the configuration space obstacle, RRT to plan a path in the configuration space among obstacles, differential flatness to design trajectory for the nonholonomic car-like robot, backstepping control to track the trajectory.

Selected Coursework

Deep Learning, Machine Learning, Robot Motion Planning, Optimal Control, Nonlinear Control and Planning, Linear System, Computational Geometry, Matrix Analysis, Robot System Programming, Robot Kinematics and Dynamics