

Sean J. Wang

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RESEARCH INTERESTS

My research focuses on making robots more capable in unstructured real world environments. I am particularly interested in making reinforcement learning algorithms suitable for physical systems by improving sample efficiency and robustness.

EDUCATION

Carnegie Mellon University Anticipated Graduation: May 2022
PhD, Mechanical Engineering
GPA: 4.0

University of California, Santa Barbara June 2018
BS/MS, Mechanical Engineering
BS Major GPA: 3.97 | MS GPA: 4.0

PHD RESEARCH

Autonomous Wheeled Rough Terrain Traversal Jan. 2020 - Present
- Implemented model-based reinforcement learning in PyTorch to autonomously navigate a wheeled robot over rough terrain, simulated in Pybullet.
- Developed a domain transfer method to accelerate learning on novice systems by using "System Invariant Dynamics Models."
- Developing data-driven controllers that can quantify and account for aleatoric and epistemic uncertainty.

Robotic Environmental Sampling May 2019 - Present
- Designed and built a robot to collect soil samples from remote locations.
- Integrating sensors and controls for in situ measurement of soil contaminants.
- Developing algorithms that plan sampling locations for optimal information gain.

Contact Localization for Transparent Robots May 2018 - May 2019
- Created a velocity-based method for transparent robots to localize contact.
- Implemented method on a legged Minitaur robot and in a MATLAB simulation.

ACADEMIC & RESEARCH PROJECTS

ISLA - CMU Jan. 2019 - May 2019
- Designed a bio-inspired quadrupedal robot that rolls for more efficient locomotion.
- Simulated and optimized rolling behavior in MATLAB.

Advanced Imaging Drone - UCSB August 2016 - May 2017
- Developed pilot awareness and safety systems that allow unmanned aerial systems to fly through forest canopies and locate endangered birds.

Multi-Agent Surveillance Path Planning - UCSB Jan. 2016 - June 2016
- Created coverage control algorithms for networks of surveillance robots operating under sparse communication constraints.
- Simulated algorithms in MATLAB to evaluate performance.

Remote Bike Lock Design - UCSB Mar. 2016 - June 2016
- Created a prototype remote controlled bike lock with locating features.

RoboRat Design - UCSB Mar. 2015 - June 2015
- Built a robot capable of autonomously navigating a course to collect blocks.

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| INDUSTRY EXPERIENCE | Strand Products, Inc. Santa Barbara, CA <i>Mechanical Engineer Intern</i> - Designed machines to automate manufacturing processes of cable assemblies. | May 2017 - Aug. 2017 |
| | Continental AG. Santa Barbara, CA <i>Mechanical Engineer Intern</i> - Designed components for a long range LIDAR sensor prototype. | May 2016 - Dec. 2016 |
| TEACHING EXPERIENCE | Carnegie Mellon University 24-352 (<i>Dynamics, Systems & Controls</i>) TA | Jan. 2020 - Dec. 2020 |
| | University of California, Santa Barbara ME 10 (<i>Graphic, CAD & Design</i>) TA | Mar. 2018 - June 2018 |
| | ME 156B (<i>Mech. Eng. Design II</i>) TA | Jan. 2018 - Mar. 2018 |
| | ME 156A (<i>Mech. Eng. Design I</i>) TA | Sep. 2017 - Dec. 2017 |
| | ME 155A (<i>Control System Design</i>) Reader | Mar. 2017 - June 2017 |
| | ME 179P (<i>Robotics: Planning</i>) Reader | Mar. 2016 - June 2016 |
| | ME 179L (<i>Robotics: Design</i>) Reader | Mar. 2016 - June 2016 |
| PUBLICATIONS | 1. Sean J. Wang and Aaron M. Johnson. Domain adaptation using system invariant dynamics models. In <i>Learning for Dynamics and Control</i> . PMLR, 2021. To appear | |
| | 2. Sean Wang , Valeria Nava, Nicholas Jones, Gregory Lowry, and Aaron M. Johnson. Ground-based robots for soil collection and analysis. In <i>American Geophysical Union (AGU) Fall Meeting</i> , December 2020 | |
| | 3. Sean J. Wang , Ankit Bhatia, Matthew T. Mason, and Aaron M. Johnson. Contact localization using velocity constraints. In <i>Proceedings of the IEEE/RSJ Intl. Conference on Intelligent Robots and Systems</i> , Las Vegas, NV, Oct. 2020 | |
| | 4. Sean J. Wang , Ankit Bhatia, Matt T. Mason, and Aaron M. Johnson. Contact localization for transparent robots using velocity constraints. In <i>Dynamic Walking</i> , May 2020 | |
| | 5. Letong Wang, Sean Wang , and Aaron M. Johnson. Traversability analysis for highly maneuverable wheeled robots. Technical report, CMU Robotics Institute Summer Scholars Working Papers Journal, 2019 | |
| | 6. Jeffrey R. Peters, Sean J. Wang , and Francesco Bullo. Coverage control with anytime updates for persistent surveillance missions. In <i>2017 American Control Conference (ACC)</i> , pages 265–270. IEEE, 2017 | |
| | 7. Jeffrey R. Peters, Sean J. Wang , Amit Surana, and Francesco Bullo. Cloud-supported coverage control for persistent surveillance missions. <i>Journal of Dynamic Systems, Measurement, and Control</i> , 139(8), 2017 | |
| SKILLS | Software & Programming: C++, Python, PyTorch, PyBullet, ROS, MATLAB Algorithms: Deep Reinforcement Learning, Nonlinear Controls, Path Planning, State Estimation (Filtering) Prototyping: CAD (SolidWorks & CATIA), Basic Fabrication, Basic Circuitry | |
| HONORS & AWARDS | TCS Presidential Fellowship | Aug. 2018 - July 2019 |
| | Tirrell Award for Distinction in Undergraduate Research | May 2017 |
| | UCSB Junior Design Fair - Most Marketable Product | May 2016 |
| | 1st Place, UCSB Robotics: Design RoboRat Competition | May 2015 |