

# Sean J. Wang

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[sjw2@andrew.cmu.edu](mailto:sjw2@andrew.cmu.edu) | (408) 691-5279 | [seanjwang.github.io](https://seanjwang.github.io)

## 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.

<b>INDUSTRY EXPERIENCE</b>	<b>Strand Products, Inc. Santa Barbara, CA</b> <i>Mechanical Engineer Intern</i> - Designed machines to automate manufacturing processes of cable assemblies.	May 2017 - Aug. 2017
	<b>Continental AG. Santa Barbara, CA</b> <i>Mechanical Engineer Intern</i> - Designed components for a long range LIDAR sensor prototype.	May 2016 - Dec. 2016
<b>TEACHING EXPERIENCE</b>	<b>Carnegie Mellon University</b> 24-352 ( <i>Dynamics, Systems &amp; Controls</i> ) TA	Jan. 2020 - Dec. 2020
	<b>University of California, Santa Barbara</b> ME 10 ( <i>Graphic, CAD &amp; 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
<b>PUBLICATIONS</b>	1. <b>Sean J. Wang</b> and Aaron M. Johnson. Domain adaptation using system invariant dynamics models. In <i>Learning for Dynamics and Control</i> . PMLR, 2021. Submitted	
	2. <b>Sean Wang</b> , 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. <b>Sean J. Wang</b> , 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. <b>Sean J. Wang</b> , 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, <b>Sean Wang</b> , 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, <b>Sean J. Wang</b> , 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, <b>Sean J. Wang</b> , 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	
<b>SKILLS</b>	<b>Software &amp; Programming:</b> C++, Python, PyTorch, PyBullet, ROS, MATLAB <b>Algorithms:</b> Deep Reinforcement Learning, Nonlinear Controls, Path Planning, State Estimation (Filtering) <b>Prototyping:</b> CAD (SolidWorks & CATIA), Basic Fabrication, Basic Circuitry	
<b>HONORS &amp; AWARDS</b>	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