# Asher J. Hancock

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My research focuses on enhancing the performance, robustness, and generalization capabilities of vision-language-action (VLA) models in complex and unstructured environments. My approach is twofold: I develop test-time compute methods to improve the out-of-distribution (OOD) performance of VLAs, and train novel VLAs by treating robot actions as a form of language, unlocking the latent reasoning capabilities of foundation models for downstream control. I validate my work through rigorous real-world deployment, maintaining a close feedback loop between algorithmic development and hardware performance.

## Education

**Ph.D. in Mechanical and Aerospace Engineering,** ***Princeton University*** 2028 (Expected)

**Master of Philosophy in Engineering,** ***University of Cambridge*** 2023
Thesis: *On Relaxation Systems in Network and Systems Theory*

**Bachelor of Science in Mechanical Engineering,** ***University of Pittsburgh*** 2022

## Experiences

**Graduate Researcher,** ***Princeton University*** 2023 – Present
I work in the Intelligent Robot Motion (IRoM) Lab advised by Prof. Anirudha Majumdar. My work centers on improving the performance and reliability of robot foundation models (VLAs). In particular, I focus on enhancing the generalization and reasoning capabilities of VLAs, enabling them to handle novel, out-of-distribution (OOD) scenarios.

**Graduate Researcher,** ***University of Cambridge*** 2022 – 2023
I worked in the Controls Group advised by Prof. Rodolphe Sepulchre. My work focused on modeling biophysical (neuronal) systems using nonlinear control and operator theory.

**Pathways Intern,** ***National Aeronautics and Space Administration (NASA)*** 2020-2022
Conducted structural dynamics modeling and analysis for the Mars Ascent Vehicle (MAV), assessing vehicle integrity under critical flight loads. Designed and implemented control policies to improve the performance and autonomy of satellites. Performed trajectory design and optimization for future deep-space missions, modeling orbital mechanics to define efficient flight paths.

## Publications

**[5] Actions as Language: Fine-Tuning VLMs into VLAs Without Catastrophic Forgetting**
A.J. Hancock, X. Wu, L. Zha, O. Russakovsky, A. Majumdar. *Submitted*, 2025.

**[4] Is Your Imitation Learning Policy Better Than Mine? Policy Comparison with Near-Optimal Stopping**
D. Snyder, A.J. Hancock, A. Badithela, E. Dixon, P. Miller, R.A. Ambrus, A. Majumdar, M. Itkina, H. Nishimura. *Robotics: Science and Systems (RSS)*, 2025.

**[3] Run-time Observation Interventions Make Vision-Language-Action Models More Visually Robust**
A.J. Hancock, A.Z. Ren, A. Majumdar. *International Conference on Robotics and Automation (ICRA)*, 2025.

**[2] Blending Data-Driven Priors in Dynamic Games**
J. Lidard*, H. Hu*, A.J. Hancock, Z. Zhang, A.G. Contreras, V. Modi, J. DeCastro, D. Gopinath, G. Rosman, N.E. Leonard, M. Santos, J.F. Fisac. *Robotics: Science and Systems (RSS)*, 2024.

**[1] PAC-Bayes Generalization Certificates for Learned Inductive Conformal Prediction**

A. Sharma, S. Veer, A.J. Hancock, H. Yang, M. Pavone, A. Majumdar *Conference on Neural Information Processing Systems (NeurIPS)*, 2023.

* denotes equal contribution.

## Peer-Reviewed Workshops

**[W3] Is Your Imitation Learning Policy Better Than Mine? Policy Comparison with Near-Optimal Stopping**
D. Snyder, A.J. Hancock, A. Badithela, E. Dixon, P. Miller, R.A. Ambrus, A. Majumdar, M. Itkina, H. Nishimura. *Robot Evaluation for the Real World, RSS*, 2025.

**[W2] Run-time Observation Interventions Make Vision-Language-Action Models More Visually Robust**
A.J. Hancock, A.Z. Ren, A. Majumdar. *Safely Leveraging Foundation Models in Robotics (**Oral**), ICRA*, 2025.

**[W1] Blending Data-Driven Priors in Dynamic Games**
J. Lidard*, H. Hu*, A.J. Hancock, Z. Zhang, A.G. Contreras, V. Modi, J. DeCastro, D. Gopinath, G. Rosman, N.E. Leonard, M. Santos, J.F. Fisac. *Northeast Systems and Control Workshop (**Oral**)*, 2024.

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## Awards and Honors

- **NSF Graduate Research Fellowship (GRFP),** ***National Science Foundation*** 2022
  The GRFP provides three years of funding for graduate research.
- **Churchill Scholarship,** ***The Winston Churchill Foundation of the USA*** 2022
  The Churchill Scholarship provides funding for one year of Master's study at the University of Cambridge.
- **Goldwater Scholarship,** ***Barry Goldwater Foundation*** 2021
  National award for undergraduate researchers in STEM.

## Academic Service

### Reviewing

- International Conference on Learning Representations (ICLR) 2025 - Present
- Robotics: Science and Systems (RSS) Conference 2024 - Present
- IEEE Robotics and Automation Letters (RA-L) 2024 - Present
- IEEE International Conference on Robotics and Automation (ICRA) 2024 - Present

### Undergraduate Research Mentoring

- Micah Baker (MAE), Princeton 2025 - Present
- Hugh Salva (ME), Harvard Summer 2025

## Teaching Experience

### Teaching Assistant

- Fall 2025, MAE 345 Introduction to Robotics, Princeton MAE Department.
- Spring 2023, 3F2 Systems and Control Theory, Cambridge Information Engineering Department

## Key Skills

**Robotics:** Dynamics, Motion Planning, Feedback Control
**Machine Learning Architectures:** Neural Networks, CNNs, RNNs, Transformers, Diffusion Models, Large Language Models (LLMs), Vision-Language Models (VLMs), Vision-Language-Action Models (VLAs)
**Machine Learning Paradigms:** Supervised Learning, Self-Supervised Learning, Reinforcement Learning (RL), Imitation Learning (IL)
**Machine Learning Techniques** Fine-Tuning, Low-Rank Adaptation (LoRA), Prompt Engineering

**Software:** Python, PyTorch, Jax, Git, Unix scripting, High-Performance Computing (HPC), Robot Operating System (ROS), Weights & Biases (W&B).

## References

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