

CONTACT INFORMATION	736 Serra Street Apt. 102B Stanford, CA 94305, USA Tel: (510)-708-9690	Homepage: <a href="https://rohansinha.nl/">https://rohansinha.nl/</a> ✉ E-mail: <a href="mailto:rhnsinha@stanford.edu">rhnsinha@stanford.edu</a> Linkedin: <a href="#">connect with me here</a> Twitter: <a href="#">click to follow me</a> Github: <a href="https://github.com/GoldeneyeRohan">https://github.com/GoldeneyeRohan</a>
RESEARCH INTERESTS	Currently, my research focuses on developing methodologies that improve the reliability of ML-enabled robotic systems, particularly when these systems encounter out-of-distribution conditions with respect to their training data. More broadly, my research interests lie at the intersection of control theory, machine learning, and applied robotics.	
EDUCATION	<b>Stanford University</b> PhD. Candidate, <a href="#">Autonomous Systems Lab</a> (expected 2025) MS Candidate, Aeronautics and Astronautics (expected 2023) <i>Advisor: Prof. Marco Pavone, (Rotation: Prof. Sanjay Lall)</i>  <b>University of California, Berkeley</b> B.S. Mechanical Engineering B.A. Computer Science <i>Advisors: Prof. Francesco Borrelli, Prof. Benjamin Recht</i>	2020–present       2015–2020
EXPERIENCE	<b>Stanford University</b> – Graduate Research Assistant <i>Advisor: Prof. Marco Pavone</i> (2020–present) Research in the Stanford Autonomous Systems Lab ( <a href="#">ASL</a> ) under <a href="#">Prof. Marco Pavone</a> on reliable robot learning algorithms that are able to cope with out-of-distribution (OOD) data, ideally with provable, sample efficient closed-loop safety guarantees (e.g., in (Sinha, CDC '23) we certify a vision-based aircraft achieves > 95% success rate with < 30 samples). My work involves developing 1) runtime monitors of deep-learned components, 2) planning and control algorithms that strengthen performance OOD, and 3) data lifecycle algorithms that track and account for distributional shifts throughout repeated deployments. These works combine topics like deep learning for perception, robust trajectory optimization, deep OOD detection, conformal inference, constrained offline RL, large language models (LLMs), continual learning, and domain adaptation. Previously, I developed adaptive, robust predictive control algorithms for safe online learning by combining classical ideas in adaptive control, robust MPC, and deep Bayesian Meta-Learning. <i>Rotational Advisor: Prof. Sanjay Lall</i> (2020–2021) Research under <a href="#">Prof. Sanjay Lall</a> on interaction-aware methods in autonomous decision-making that reason intelligently about the likelihood of other agents violating traffic rules. Combining ideas in game theory, formal methods, and decision processes for certified human-robot interaction.  <b>University of California, Berkeley</b> – Undergraduate Research Assistant <i>Advisor: Prof. Benjamin Recht</i> (2019–2020) Research on learning-based control strategies from monocular visual sensing under <a href="#">Prof. Benjamin Recht</a> at the Berkeley AI Research Lab ( <a href="#">BAIR</a> ). Developed a model car that races autonomously at high speeds in cluttered environments from a single human demonstration. <i>Advisor: Prof. Francesco Borrelli</i> (2018–2019) Research focused on data-driven control algorithms under <a href="#">Prof. Francesco Borrelli</a> at the Model Predictive Control ( <a href="#">MPC</a> ) Lab. Worked on Learning Model Predictive Control (LMPC) strategies with convergence to model-free learned strategies subject to stochastic disturbances, and LMPC for multi-agent autonomous racing.  <b>Amazon Inc.</b> – Software Development Engineering Intern Software Engineering Intern at Amazon Digital Music. Completed a data engineering project to collect and analyze gigabytes of search traffic and server performance data generated every minute throughout the Music Search pipeline to monitor and manage the large-scale distributed search cluster system.  <b>Motional Inc.</b> (Formerly Delphi Automotive)– Autonomous Driving Engineering Intern Summer internship working on Self-Driving Cars for Delphi automotive in the Delphi, Intel/Mobileye, BMW Partnership. Developed and validated high fidelity vehicle dynamics models and utilized them to perform exploratory research projects using nonlinear online estimation techniques such as EKF and UKF.	2020-present   <

## TEACHING

**AA289/CS529: Robotics and Autonomous Systems Seminar** – Organizer 2022-present  
Organizer for a weekly seminar hosting invited speakers from both academia and industry to present state-of-the-art research and innovation on robotics and autonomous systems. As an organizer, I 1) invite speakers and host them for their visit, 2) manage the seminar schedule and \$30k annual travel budget, 3) coordinate logistics for a 150+ student course. Talks are publicly available via the [course webpage](#) and Youtube, which have accumulated over 170k views.

**EE263: Introduction to Linear Dynamical Systems**—Course Assistant 2020  
One of the lead TA's for graduate course in linear algebra and dynamical systems under Prof. Sanjay Lall. I was responsible for general course logistics, held weekly discussion sections and office hours, wrote homework assignments and exams, and managed the team of graders for the course.

**CS61B: Data Structures**—Lab Assistant 2018  
Lab Teaching Assistant for Computer Science 61B at UC Berkeley. CS61B is a fundamental software engineering course covering OOP, data structures, introductory graph theory, and other essential programming concepts.

## SERVICE AND LEADERSHIP

**Graduate Steering Committee Member, Stanford Robotics Center** – Stanford University (2023-present)

**Principle Workshop Organizer** – Workshop on [Out-of-Distribution Generalization in Robotics: Towards Reliable Learning-based Autonomy](#), to be held at the 2023 Conference on Robot Learning.

**President, Dutch Student Association @ Stanford** – Stanford University, previously vice-president from 2022-2023 (2023-present)

**Mentor, Stanford Robotics Center Summer Research Program** – Mentoring first generation, low income, and racially minoritized students with the goal of providing real-world experiences in science and engineering research (2023)

**Organizer, Dutch Royal Visit** – I was key in organizing a [state visit by H. M. Queen Maxima of the Netherlands to Stanford](#), accompanied by a trade delegation comprising Dutch cabinet ministers, industry and nonprofit executives, and academic leaders: I organized a seminar on autonomous driving, a panel on AI, a student lunch with the education minister, and [an autonomous vehicle showcase](#) that was extensively covered in the media.

**Reviewer** – IEEE TCST (2021), WAFR (2022), IEEE CCTA (2022), IEEE CDC (2023), AAAI (2023)

**Diversity, Equity, and Inclusion Committee Member** – Stanford Aero/Astro (2020–present)

**President, Goldeneye Student Engineering Team** – UC Berkeley (2017–2019)

**Officer, California Sailing Team** – UC Berkeley (2016–2017)

## INVITED TALKS

**Runtime Monitoring of Learning-based Autonomy** – To be presented at Apple Inc., Special Projects Group ML seminar (August 2023)

**Runtime Monitoring of Learning-based Autonomy** – Presented at the IEEE Space Mission Challenges for Information Technology - IEEE Space Computing Conference, workshop on Addressing Trust Challenges in Space Autonomy (July 2023)

**Avoiding failures in ML-enabled systems: Tutorial on Runtime Monitoring and Contingency Planning** – Presented at the Stanford Center for Automotive Research industry affiliate program (July 2023)

**Runtime Monitoring of Learning-based Autonomy** – Presented at the annual meeting of the NASA University Leadership Initiative, Safe Aviation Autonomy (June 2023)

## PUBLICATIONS Journal Publications:

1. Elhafsi, A., **Sinha, R.**, Agia, C., Schmerling, E., Nesnas, I. A. D., Pavone, M., (2023a). “Semantic Anomaly Detection with Large Language Models”. In: *Autonomous Robots*. Special Issue on Large Language Models in Robotics (accepted)
2. **Sinha, R.**, Sharma, S., Banerjee, S., Lew, T., Luo, R., Richards, S. M., Sun, Y., Schmerling, E., Pavone, M., (2022). “A System-Level View on Out-of-Distribution Data in Robotics”. In: *arXiv preprint arXiv:2212.14020*
3. **Sinha, R.**, Harrison, J., Richards, S. M., Pavone, M., (2022a). “Adaptive Robust Model Predictive Control via Uncertainty Cancellation”. In: *IEEE Transactions on Automatic Control*. (submitted). Available at <https://arxiv.org/abs/2212.01371>

## Conference Publications:

1. **Sinha, R.**, Schmerling, E., Pavone, M., (2023). “Closing the Loop on Runtime Monitors with Fallback-Safe MPC”. in: *Proc. IEEE Conf. on Decision and Control*. (accepted). URL: <https://tinyurl.com/fallback-safe-mpc>
2. Luo, R., **Sinha, R.**, Hindy, A., Zhao, S., Savarese, S., Schmerling, E., Pavone, M., (2023). “Online Distribution Shift Detection via Recency Prediction”. In: *Conf. on Robot Learning*. (submitted)
3. Elhafsi, A., **Sinha, R.**, Agia, C., Schmerling, E., Nesnas, I. A. D., Pavone, M., (2023b). “Semantic Anomaly Detection with Large Language Models”. In: *Robotics, Systems and Science; Workshop Towards Safe Autonomy: New Challenges and Trends in Robot Perception*
4. **Sinha, R.**, Harrison, J., Richards, S. M., Pavone, M., (2022b). “Adaptive Robust Model Predictive Control with Matched and Unmatched Uncertainty”. In: *American Control Conference*
5. **Sinha, R.**, Lall, S., (2022). “Cautious Markov Games for Interaction Aware Robotics”. In: *Conference on Robot Learning: Workshop on Strategic Multi-Agent Interactions*
6. Anand, R. \*, English, A. \*, Gao, D. \*, Malekshahi, S. \*, **Sinha, R. \***, Stevenson, N. \*, (2017). “Goldeneye AB1”. In: *Presented at NASA Aeronautics Design Challenge*. (**Third place/honorable mention**). URL: <http://goldeneyerohan.github.io/files/GoldeneyeAB1.pdf>. \*equal contribution

## Other Writing:

1. Brown, R. \*, Dyro, R. \*, **Sinha, R. \***, (2021). *Covariate Shifts in Multi-Agent Interactions*. Tech. rep. Stanford CS329D. \*equal contribution
2. **Sinha, R.** (2021b). *Solving Multi-Agent Zero-Sum Games with Mirror Descent*. Tech. rep. Stanford EE364B
3. **Sinha, R. \***, Soroka, E. \*, (2021). *Pose Graph Optimization Using Matrix Sketching*. Tech. rep. Stanford AA273. \*equal contribution
4. **Sinha, R.** (2021a). *Multi-Vehicle Autonomous Racing with Learning MPC and Trajectory Forecasting*. Tech. rep. Stanford AA277
5. **Sinha, R.** (2020). *Cautious Markov Games, a Novel Framework for Human-Robot Interaction*. Tech. rep. (**Best Project Paper**). Stanford AA228
6. Narang, A. \*, **Sinha, R. \***, Siththaranjan, A. \*, Yang, F. \*, (2019). *Data-Poisoning for Linear Models*. Tech. rep. UC Berkeley EE227B. URL: <https://rohansinha.nl/portfolio/projects-4/>. \*equal contribution
7. Anderson, J. \*, Chang, B. \*, Cosner, R. \*, Kruger, S. \*, Lim, R. \*, **Sinha, R. \***, (2019). *Oversized Load Lifting and Yielding (Project OLLY)*. tech. rep. (**Best Project**). UC Berkeley ME102B. URL: <https://rohansinha.nl/portfolio/projects-3/>. \*equal contribution
8. Anand, R. \*, Anderson, J. \*, Lim, R. \*, **Sinha, R. \***, (2019). *MPC Control of Multiple Quadcopters Cooperatively Lifting an Object*. Tech. rep. UC Berkeley ME231A. URL: <https://rohansinha.nl/portfolio/projects-2/>. \*equal contribution

## HONORS AND AWARDS

Honorable Mention, NSF Graduate Research Fellowship Program	2021
Best project award, AA228: Decision Making Under Uncertainty	2020
Honors at graduation, UC Berkeley Faculty of Mechanical Engineering	2020
Distinction in General Scholarship, UC Berkeley Faculty of Computer Science	2020
Best Project Award, ME102B: Capstone Mechatronics Design	2019
Third place, NASA Aeronautics Advanced Aerial Vehicles Student Challenge	2017
Tau Beta Pi Honor Society, UC Berkeley	2017
Pi Tau Sigma Honor Society, UC Berkeley	2017
Dean’s List, UC Berkeley College of Engineering	2015–2019
Top 10 Finalist, National Physics Olympiad, the Netherlands	2015

## MENTORING

Shahir Rahman (2022), currently CS Ph.D. candidate at Stanford  
Gabriel Escatel (2023), currently BS candidate at Foothill Community College  
Matthew Foutter (2023), currently ME MS candidate at Stanford

## SKILLS AND INTERESTS

**Languages:** English (fluent), Dutch (native), French (proficient), German (elementary).  
**Technical Skills:** Python, Java, C/C++, Matlab, ROS, RISC-V, Solidworks, Simulink.  
**Sports/Hobbies:** Sailing, Tennis, Soccer, Field Hockey, Snowboarding.