

HIMANI SINHMAR

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EDUCATION

Ph.D. Advisor: Prof. [Hadas Kress-Gazit](#), Mechanical and Aerospace Engineering, Cornell University (2019 - present)
Specialization in Robotics, Minor in Computer Science CPGA: 3.9/4.0

Bachelor and Master of Technology Indian Institute of Technology Bombay (2014 - 2019)
Specialization in System and Controls, Major in Aerospace Engineering, Minor in Physics CPGA: 8.7/10

RESEARCH FOCUS AND SKILLS

My research focuses on developing motion planning strategies and scalable controllers for robotic systems while providing convergence guarantees. I have experience implementing path planning algorithms while guaranteeing correctness and collision-avoidance on physical platforms such as mobile manipulator [Stretch Robot](#), Create robot, and Vectors.

Research Interests: Motion Planning, Robot Manipulation, Dynamics and Control, Autonomous Vehicles

Programming Languages: C++, Python, MATLAB, C#

Tools: Unity Game engine, Robot Operating System (ROS), ANSYS, SolidWorks

PEER-REVIEWED PUBLICATIONS

- **Himani Sinhmar**, Hadas Kress-Gazit, *Decentralized Control of Minimalistic Robotic Swarms For Guaranteed Encapsulation Behavior*, [\[Paper\]](#) International Conference on Intelligent Robots and Systems (IROS 2022)
- **Himani Sinhmar**, Vinod Kumar, *Relative Autonomous Navigation Without Communication Between Spacecraft Using Line of Sight Measurements* [\[Paper\]](#) IEEE/CSAA Guidance, Navigation and Control Conference, August 2018
- **Himani Sinhmar**, Srikant Sukumar, *Distributed model independent algorithm for spacecraft synchronization under relative measurement bias* [\[Paper\]](#), 5th CEAS Conference on Guidance, Navigation and Control, (EuroGNC 19)
- Pallavi Sinha, Srikant Sukumar, **Himani Sinhmar**, *Consensus of networked double integrator systems under sensor bias*, [\[Paper\]](#) International Journal of Adaptive Control and Signal Processing

RESEARCH EXPERIENCE

Task and Motion Planner for Robot Manipulation [\[github\]](#) (Jan'22 - May'22)

Project with Prof. [Tapomayukh Bhattacharjee](#), Cornell University

Developed & implemented a reactive planner to satisfy a high level task in a dynamic environment on **Stretch Robot**

Motion Planning, Localization, and Mapping for iRobot Create [\[github\]](#) (Jan'20 - May'20)

Project with Prof. [Hadas Kress-Gazit](#), Cornell University

Implemented SLAM, and planning algorithms on **iRobot Create** for goal-navigation with collision avoidance

Cooperative Control Under Bias in Measurements (May'18 - May'19)

Master's thesis with Prof. [Srikant Sukumar](#), IIT Bombay

Created a provable controller for a multi-agent system to track a time-varying trajectory under unknown sensor bias

Control and Simulation Design for a Morphing Robot (Aug'19 - Aug'21)

Advisor Prof. [Hadas Kress-Gazit](#), Cornell University

Created a physics-based simulator in *Unity* for synthesis of optimal locomotion gaits for shape-shifting origami robot

Autonomous Navigation for Spacecraft Rendezvous (May'17 - Dec'17)

Research Co-op with [Control Dynamics & Simulations Group](#), ISRO

Developed an algorithm for relative navigation between spacecraft in the event of communication & gyroscope failures

ACHIEVEMENTS AND RESPONSIBILITIES

- Awarded the **Institute Undergraduate Research Award**
- **Session Chair** for: *Swarm Robotics* in IROS 2022, *Navigation Technology* in 2018 IEEE/CSAA GNC Conference
- **Reviewer** for *IEEE Transactions on Robotics* and *IEEE Transactions on Control of Network Systems*
- Lead a session on microscopic robots and differential geometry in [EYH](#) conference
- Graduate Teaching Assistant: Autonomous Mobile Robots, Spaceflight Mechanics, Dynamics and Control
- Graduate Resident Fellow at Willam T. Keeton House, Cornell University