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], 5^{th} 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 localization, mapping, and planning algorithms on **iRobot Create** for navigation and 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