HIMANI SINHMAR

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EDUCATION

Ph.D. *Advisor: Prof. Hadas Kress-Gazit, Mechanical and Aerospace Engineering, Cornell University* (2019 - 2024)
Specialization in Dynamics, Controls and 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 verifiable-safe motion planners and controllers for robotic systems with resource-efficient hardware to tackle the practical limitations inherent in the real world. I utilize insights from diverse disciplines such as control theory, collective intelligence, formal methods, sensor networks, and optimization. I have implemented various motion planners on physical platforms such as mobile manipulator Stretch Robot, UAV Crazyflie 2.1, mobile robot iRobot Create.

Research Interests: Motion Planning, Robot Manipulation, Dynamics and Control, Autonomous Mobile Robots
Programming Languages & Tools: C++, Python, MATLAB, C#,Unity Game engine, ROS, ANSYS, SolidWorks

PEER-REVIEWED PUBLICATIONS

6. **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)
5. **Himani Sinhmar**, Hadas Kress-Gazit, *Guaranteed Encapsulation of Targets with Unknown Motion by a Minimalist Robotic Swarm*, [Paper] Accepted in Transactions on Robotics, (TRO 2023)
4. **Himani Sinhmar**, Marcus Greiff, Stefano Di Cairano *Practical and Safe Navigation Function Based Motion Planning of UAVs*, under review in International Conference on Robotics and Automation, (ICRA 2024)
3. **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)
2. **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
1. Pallavi Sinha, Srikant Sukumar, **Himani Sinhmar**, *Consensus of networked double integrator systems under sensor bias*, [Paper] International Journal of Adaptive Control and Signal Processing, November 2022

PROFESSIONAL AND RESEARCH EXPERIENCE

Practical and Safe Motion Planning of UAVs (May'23 - Aug'23)
Research Internship with Dr. Marcus Greiff, Mitsubishi Electric Research Labs (MERL)
Developed safe motion planners for real-time navigation of constrained UAVs in cluttered polyhedral environments

Learning for Task Allocation and Motion Planning (Jan'23 - May'23)
Project with Prof. Sanjiban Choudhury, Cornell University
Developed imitation learning & Q-learning policies for task allocation and execution in heterogeneous robotic teams

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

IMU Alignment of a Store Dropped from Aircraft (May'18 - Aug'18)
Research Internship with Dr. Aditya Paranjape
Designed an in-flight IMU transfer-alignment algorithm using sensor fusion & state estimation for INS/GPS integration

Hardware Algorithm Co-Design for a Morphing Soft Robot (Aug'19 - Aug'21)
Project with Prof. Hadas Kress-Gazit and Prof. Itai Cohen, Cornell University
Created a physics-based simulator in *Unity* for synthesis of optimal locomotion gaits for shape-shifting origami robot