HIMANI SINHMAR

+1-(607)-279-7653 hs962@cornell.edu himani-sinhmar https://himanisinhmar.github.io

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

I am developing decentralized motion planning strategies that can guarantee the emergence of desired behavior for a robotic swarm with no memory, no direct communication, biased measurements, and asynchronous sensor execution. In addition to this, I have also created a *Unity* simulator for synthesizing control of a micron scale metamaterial-based sheet robot.

Research Interests: Autonomous Vehicles, Task and Motion Planning, Dynamics and Control, Multi-agent Systems
Programming Languages: C#, C++, Python, MATLAB
Tools: Unity Game engine, Robot Operating System (ROS), ANSYS, SolidWorks, AutoCAD

PEER-REVIEWED PUBLICATIONS

- **Himani Sinhmar**, Hadas Kress-Gazit, *Decentralized Control of Minimalistic Robotic Swarms For Guaranteed Encapsulation Behavior*, International Conference on Intelligent Robots and Systems (IROS 2022) [Accepted]
- **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*, International Journal of Adaptive Control and Signal Processing [Accepted]

RESEARCH EXPERIENCE

Tool and Affordance Based Robot Manipulation Task and Motion Planner (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**

Simultaneous Localization and Motion Planning (SLAM) for iRobot Create (Jan'20 - May'20)
Project with Prof. Hadas Kress-Gazit, Cornell University
Implemented SLAM algorithm on **iRobot Create** for goal navigation and collision avoidance with dynamic obstacles

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

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

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
- Lead a session on microscopic robots and differential geometry in EYH conference
- Graduate Teaching Assistant: Autonomous Mobile Robots, at Cornell University
- Graduate Teaching Assistant: Dynamics and Control, Spaceflight Mechanics, at IIT Bombay
- Graduate Resident Fellow at Willam T. Keeton House, Cornell University