

TECHNICAL COMMITTEE FOR

MODEL-BASED OPTIMIZATION FOR ROBOTICS



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2025-2026 TC Seminar Series

Time: April 10th, 2026, 9AM PST / 12PM EST

Zoom: <https://dartmouth.zoom.us/j/94765993258?pwd=aErnkjFBqOaOTEgonxZkeNTbojHRbp.1>



Prof. Somil Bansal

Stanford University

*Learning Safety in the Open World:
From Reachability to Foundation Models*

Abstract: As autonomous systems and robots are increasingly deployed in open-world settings, ensuring their safety has emerged as a fundamental challenge. Unlike controlled environments, open-world scenarios are characterized by pervasive uncertainty—in the environment, system dynamics, and, critically, in the semantics of what constitutes safe behavior. These challenges strain the assumptions underlying traditional safety frameworks rooted in control theory and formal verification.

In this talk, I will present a new perspective on extending classical safety paradigms to open-world autonomy. At the core is the idea of learning safety representations directly from rich, high-dimensional observations and human-interpretable specifications. Concretely, I will introduce observation-conditioned reachability, which enables safety reasoning directly from visual inputs, and language-conditioned reachability, which allows safety constraints to be specified and enforced through natural language. Building on these ideas, I will show how reachability-based safety representations can serve as real-time guardrails and fallback mechanisms for modern AI-enabled systems, including for state-of-the-art foundation and generative models.

Biography: Somil Bansal is an Assistant Professor in the Department of Aeronautics and Astronautics at Stanford University, where he leads the Safe and Intelligent Autonomy (SIA) Lab. Somil is broadly interested in developing mathematical tools and algorithms for the control and analysis of robotic and autonomous systems, with a focus on the safety of AI-enabled autonomous systems. He received a Ph.D. in Electrical Engineering and Computer Sciences (EECS) from the University of California, Berkeley, in 2020. Before that, he obtained a B.Tech. in Electrical Engineering from the Indian Institute of Technology, Kanpur, and an M.S. in Electrical Engineering and Computer Sciences from UC Berkeley in 2012 and 2014, respectively. After his PhD, he spent a year as a Research Scientist at Waymo, focusing on safe planning for autonomous vehicles. He has also collaborated closely with companies like Skydio, Google, TRI, NVIDIA, Boeing, as well as NASA JPL on deploying his safety algorithms on real-world autonomous systems. Somil has received several awards, most notably the NSF CAREER award, IEEE Early Career Award in Robotics and Automation, Eli Jury Award at UC Berkeley for his doctoral research, and research awards from Toyota and Open Philanthropy.