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Learning and Robust Perception for Aerospace Autonomy

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ABSTRACT:

Onboard learning and robust perception can be generally viewed to characterize autonomy as overarching system-level properties. The complex interplay between autonomy and onboard decision support systems introduces new vulnerabilities that are extremely hard to predict with most existing guidance and control tools. In this seminar, we review some recent advances in learning theory, multi-threaded adaptation, information-aware path-planning, sub-modularity metrics for non-myopic sensor scheduling, and covariance control for "plug-and-play" systems. The "multi-threaded" adaptation framework is realized through certain new classes of exploration inducing distance metrics. These technical foundations will be highlighted through aerospace applications with active learning inside dynamic and uncertain environments.

BIOGRAPHY:

Maruthi Akella is a professor in Aerospace Engineering and Engineering Mechanics at UT Austin where he holds the Cockrell Family Endowed Chair in Engineering. He is founding director for the Center for Autonomous Air Mobility and faculty lead coordinator for the controls, autonomy, and robotics area at UT Austin. His research encompasses coordinated systems, learning, adaptation, and vision-based sensing. The major impacts of Dr. Akella's work have been recognized through the AIAA Mechanics and Control of Flight Award, the AAS Dirk Brouwer Award, the IEEE-CSS Award for Excellence in Aerospace Control, and the Judith Resnik Space Award from the IEEE Aerospace and Electronic Systems Society. Dr. Akella is Editor-in-Chief for the Journal of the Astronautical Sciences and a Fellow of the AIAA, IEEE, and AAS.