Cooperative Transport of Slung Loads by Teams of Autonomous Rotorcraft

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**ABSTRACT:** Cooperative transport of slung loads has been the subject of academic study and field trials for several decades. The combination of very complex dynamics as well as the severe consequences of accidents has made practical implementation difficult, but developments in autonomous rotorcraft has led to renewed interest in coordinated transport, with a focus on enabling fully autonomous handling of large, heavy payloads.

This presentation will discuss our recent work, which seeks to combine research into cooperative transport and manipulation from the space robotics community with helicopter flight controls research to develop a hierarchical implementation that is scalable. A combination of analysis and results or Monte Carlo simulations will show the benefits of this approach and also highlight some of the difficulties and pitfalls associated with this problem.

**BIO:** Jack Langelaan is an Associate Professor in the Department of Aerospace Engineering at Penn State University. His research focuses on path planning, control, state estimation and data fusion, applied especially to navigation, obstacle avoidance, and long-range flight of small uninhabited aircraft. He received his Ph.D. in Aeronautics and Astronautics from Stanford University in 2006; prior to Stanford he worked as an engineer at Bombardier Aerospace in Toronto, Canada. In 2011 he was leader of Team Pipistrel-USA.com, winner of the NASA/CAFE Green Flight Challenge with the Taurus G4 aircraft.

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