“Control Methods for Quadrotor Helicopters”

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Abstract: Quadrotor helicopters are agile crafts with impressive dynamic capabilities. In this presentation I will describe the multiple quadrotor testbed used at the GRASP Lab at the University of Pennsylvania and several projects that have been conducted in this space. I will describe a couple different trajectory generation methods which enable flight through narrow windows, robust perching on vertical surfaces, and dynamically optimal flight through thrown hula hoops. I will also describe a control method for multiple quadrotors rigidly attached to the same payload which enables cooperative transport. I will describe work involving teams of quadrotors autonomously building 3-D structures from simple modular pieces. Finally, I will present experiments with a swarm of 20 nanoquadrotors.

Bio: Daniel Mellinger is a Co-President of KMel Robotics. He will graduate with a PhD in Mechanical Engineering from the University of Pennsylvania in May 2012. In 2007 he received a B.S. in Mechanical Engineering from North Carolina State University and in 2010 he received an M.S. in Mechanical Engineering from the University of Pennsylvania. He has worked on a number of robotics projects including rolling robots, walking robots, and flying quadrotor helicopters. His recent work with quadrotors has yielded a number of publications including the Best Conference Paper at the 2011 IEEE International Conference on Robotics and Automation and the Best Student Paper at the 2010 International Symposium on Distributed Autonomous Robotic Systems. His work has also received attention from the popular media and has been covered by Discovery, NY Times, Popular Science, Engadget, and the Colbert Report. To date the videos of his research have received more than 12 million views on YouTube.