THE SCHOOL OF AEROSPACE AND MECHANICAL ENGINEERING PRESENTS

On the Past, Present, and Future of Unmanned Aircraft Autonomy

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Abstract: The evolution of Unmanned Aircraft Systems (UAS) over the most recent 25 years has seen an impressive rate of innovation. The time between a new technology first appearing in academia and being available in a consumer product can be very short compared to typical aerospace applications. Throughout this period, the navigation, guidance, and control challenges in UAS have been among the most significant barriers to wider use. That remains true today. This talk will reflect upon past work at Draper and Georgia Tech, and lessons learned about which technologies have "made it" and perhaps why. Specific highlights include one of the first small GPS-navigated helicopters, fault-tolerant control results, and the automatic transition of an airplane to/from tail-sitting hover. Later work includes sensing and avoiding other aircraft and obstacles, navigation without reliance on Global Positioning Satellite systems (GPS), and multi-aircraft cooperative autonomy. This will include progress in both theory and related flight test validation.

Bio: Eric N. Johnson is a Professor of Aerospace Engineering at Pennsylvania State University. He received a B.S. degree from University of Washington, M.S. degrees from MIT and The George Washington University, and a Ph.D. from Georgia Tech. He also has five years of industry experience working at Lockheed Martin and Draper. As faculty since 2001, he has performed research in unmanned aircraft fault-tolerant control, aided inertial navigation, and autonomy. This work has included the first air-launch of a hovering aircraft, automatic flight of a helicopter with simulated frozen actuators, and vision-based air-to-air tracking. His most recent work has included automatic low altitude high speed flight of helicopters, indoor and outdoor vision-aided inertial navigation, aerial manipulation, and methods for sensing and avoiding other aircraft.

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