Navigation, Guidance, and Control to Enable Wider Use of Small Unmanned Aircraft

ABSTRACT

The Georgia Institute of Technology Unmanned Aerial Vehicle Research Facility team is known for its research in the areas of navigation, guidance, and control; including flight testing. This work has included the first air launching of a hovering aircraft, the first automatic transition of an airplane to/from tail-sitting hover, vision-only formation flight, vision-aided inertial navigation, automatic helicopter flight with simulated stuck swash plate actuator, automatic airplane flight with half of one wing missing, and cooperative operations with multiple aircraft. The navigation, guidance, and control challenges for Unmanned Aerial Systems are among the most significant barriers to wider military or non-military use. This includes sensing and avoiding other aircraft and obstacles as well as navigation without reliance on Global Positioning Satellite systems. This presentation will address recent progress in the areas UAS navigation, guidance, and control, with emphasis on fault tolerant control, vision-aided inertial navigation, and laser-aided inertial navigation. This will include progress in both theory and related flight test validation on unmanned research aircraft.

BIO

Eric N. Johnson is the Lockheed Martin Associate Professor of Avionics Integration, Daniel Guggenheim School of Aerospace Engineering, Georgia Institute of Technology. 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, all in Aerospace Engineering. He also has five years of industry experience working at Lockheed Martin and Draper Laboratory. As Georgia Tech faculty since 2001, he has performed research in adaptive flight control, aided inertial navigation, and autonomous systems. He was the lead system integrator for rotorcraft experiments for the DARPA Software Enabled Control program, which included the first air-launch of a hovering aircraft, automatic flight of a helicopter with a simulated frozen actuators, and adaptive flight control. He was the principal investigator of the Active Vision Control Systems AFOSR Multi-disciplinary University Research Initiative (MURI), which culminated in vision-based air-to-air tracking and vision-aided inertial navigation experimental validation. His most recent work has included automatic low altitude high speed flight of helicopters, indoor and outdoor vision-aided inertial navigation, fault tolerant control, and methods for sensing and avoiding other aircraft.

Refreshments will be served at 3:45 p.m.
Hosted by John Valasek