Making Unmanned Aerial Vehicles Smarter

Recent test demonstrates in-flight ability to autonomously reconfigure low-level control system.

by JOHN TOON

Recent world events have highlighted the utility of unmanned aerial vehicles (UAVs) for both military and civilian applications. In manned aircraft, the pilot is in control, functioning as the integrator of the on-board subsystems and mitigating problems when they occur. With the advent of UAVs, the human integrator capability is lost, which increases the probability of aircraft loss and/or mission failure. Current UAVs are not robust enough to deal with all the circumstances they may encounter, Vachtsevanos says. “The SEC program is creating the enabling technologies to make this type of vehicle more reliable, robust and truly autonomous.”

This past spring, testing took place on the GTMAX system, a UAV helicopter test bed based on the Yamaha RMAX remotely piloted helicopter that includes a modular, open systems avionics package along with the OCP. This modular, open systems architecture test bed allows both software-in-the-loop and hardware-in-the-loop testing, in addition to flight testing. Thus, the GTMAX provides a safe and very flexible method for testing advanced control and sensing techniques. In addition to Schrage and Vachtsevanos, the effort involves Eric Johnson, J.V.R Prasad, Bonnie Heck and Linda Wills of Georgia Tech, along with David Germain, Jim Fusanika, Brian Meredo and Eric Martens of Boeing Phantom Works.

The SEC program plans a number of progressive technology demonstrations over the next two years. While the springtime benchmark demonstration was a major accomplishment, Schrage says, additional demonstrations will go a long way to transferring the SEC technologies, including the OCP, to the UAV community.

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Above: Researchers pose with GTMAX, Georgia Tech’s test bed UAV helicopter. They are, left to right, Henrik Christophersen, Dan Schrage, Eric Johnson, George Vachtsevanos and Jeong Hur.

The SEC program will also give the machines more agility, helping them to avoid hostile actions without exceeding critical flight parameters.