Integrating UAS in the NAS: Assurance and Autonomy

Thursday, October 15, 2015
4:00 p.m. | 202 Reed McDonald Building

Abstract

The lack of explicit consideration of unmanned aerial systems is regarded as being one of the primary socio-technical barriers to the successful integration of UAS into civil airspace. While incremental steps are being taken to integrate certain groups of UAS into the various national airspace systems (NAS), much work remains to be done in order to establish appropriate regulatory infrastructure that allows a wide variety of classes of UAS to operate in the NAS for commerce or hire. The magnitude of that effort is compounded by the wide-ranging variety of unmanned aircraft types and possible applications, as well as the diversity in quality and provenance of UAS components. This talk is divided into two main sections. In the first half, we examine the current regulatory framework for the certification of conventionally piloted aircraft (CPA), and make observations regarding the applicability of this approach to enable the integration of UAS of varying degrees of autonomy into the NAS. In order to provide a global perspective, we also survey recent international efforts to develop regulatory standards for UAS. The second half of the talk details a precision agriculture rotorcraft case study, which is then used to develop a candidate certification basis. In particular, the use of a certifiable or assured containment system is examined in technical detail, as a prospective modular approach to reduce the effort needed to regulate some UAS that could not currently meet rigorous aircraft design standards. Novel approaches to assurance for certification purposes regarding issues relating to stability, maneuverability and control, as well as clock synchronization will be discussed.

Dr. Natasha Neogi is a research engineer at the NASA Langley Research Center. She currently splits her time working on the UAS Integration in the NAS project and Safe Autonomous Systems Operation project. Her primary research interests are in the verification and validation of software-intensive safety-critical infrastructure systems, as well as certification issues concerning airworthiness of UAS. She received her B.Eng.Hons. in Mechanical Engineering from McGill University in Montreal, Canada. She went on to pursue a M.Phil in Physics from Cambridge University in Cambridge, UK, and then received an M.Sc and Ph.D in Aeronautical and Astronautical Engineering from the Massachusetts Institute of Technology in Cambridge, Massachusetts. Prior to working at NASA Langley, she was an assistant professor at the University of Illinois, Urbana-Champaign in the Department of Aerospace Engineering, where she led the Aerospace Laboratory for Autonomous Embedded Systems (ALEAS). She is an associate fellow of the AIAA, and was the recipient of the AIAA Robert A. Mitcheltree and PEC Doug P. Ensor Young Engineer awards in 2012. She has numerous awards and publications in AIAA, IEEE and ACM conferences and journals.

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