



# Seminar Experience

ELECTRICAL & COMPUTER ENGINEERING

Friday, October 24

10:00—11:00 am

FIU Engineering Center

EC Room # 1107

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## *“Unmanned Aircraft Systems: Challenges in Navigation and Control and in Design for Autonomy”*

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### ABSTRACT

Unmanned Aircraft Systems (UAS) have seen unprecedented levels of growth during the last decade, with even more expectations for future utilization in a very wide spectrum of applications, both military and civilian. However, focusing on the civilian use of UAS, and before *‘our pizzas are delivered from the sky’* and *‘our packages are dropped in our front door from quadrotors’* it is essential that R&D at least in the areas of robust and fault-tolerant UAV navigation and control, sense-detect-and-avoid/see-and-avoid systems for mid-air collision avoidance, design for autonomy and UAV safety and reliability, reaches levels that are ‘acceptable’ by the civilian authorities (i.e., FAA, ICAO, etc.) before UAS integration into the national airspace system.

This seminar presents several justifiable challenges, emphasizing design approaches that contribute to overcoming the above mentioned challenges, also offering an alternative design for fixed-wing UAVs, based on Circulation Control, which improves endurance and increases payload during flight. Design for autonomy steps are discussed, the ‘human-in-the-loop’ and the ‘human-on-the-loop’ concepts are presented and put in context of the complete UAS – Ground Control Station ensemble. A comprehensive and modular UAS control architecture is presented, aiming at facilitating software developments regardless of specific hardware.

### BIOGRAPHY

Dr. Valavanis received the Diploma in Electrical and Electronic Engineering (5 years of study) in 1981 from the National Technical University of Athens, Greece, and he completed the Professional Engineer (PE) exams in Electrical and Mechanical Engineering in February 1982. He received the M.Sc. degree in Electrical Engineering and the PhD degree in Computer and Systems Engineering from Rensselaer Polytechnic Institute (RPI) in 1984 and 1986, respectively.

He joined the University of Denver on September 1, 2008, as Professor and Chair of the Electrical and Computer Engineering Department. Since July 1, 2009, he is also Acting Chair of the Computer Science Department. In 2009, he established the DU Unmanned Systems Laboratory (DU2SL), serving as its Director. He is also Guest Professor in the Faculty of Electrical Engineering and Computing, Department of Telecommunications, University of Zagreb, Croatia.