Το Εργαστήριο Ρομποτικής και Αυτομάτου Ελέγχου - RCS Lab
του Τμήματος Πληροφορικής & Τηλεπικοινωνιών του Πανεπιστημίου Θεσσαλίας
σας προσκαλεί να παρευρεθείτε στην διάλεξη* του

Dr. Kimon P. Valavanis, John Evans Professor

Fellow, American Association for the Advancement of Science (AAAS)
Fellow, U.K. Institute of Measurement and Control
D. F. Ritchie School of Engineering and Computer Science
University of Denver, Denver, CO 80208, USA
Kimon.Valavanis@du.edu

με θέμα:

Modeling and Navigation Controller Design of a Circulation Control Fixed-Wing UAV

Η διάλεξη θα γίνει την **Τετάρτη, 1 Ιουνίου 2022, ώρα 12:00**
στο **Αμφιθέατρο του κτιρίου της Βιβλιοθήκης του Π.Θ. στη Λαμία**
(3ο χλμ. Π.Ε.Ο. Λαμίας – Αθηνών)

ABSTRACT

Circulation Control (CC) is an effective technique that allows for increasing lift and improving aerodynamic efficiency of Unmanned Aerial Vehicles (UAVs). CC-based UAVs exhibit enhanced aerodynamic performance in terms of reduced runway for take-off and landing, increased effective payload capability and delayed stall. However, CC introduces changes of the aerodynamic coefficients that are difficult to determine using strict mathematical formulas. It creates a specific type of model uncertainty in the CC-based fixed-wing Unmanned Aerial Vehicle (UC^2AV), which must be addressed and accommodated for; this is tackled using μ-analysis. A detailed systematic approach to parameter identification of the UC^2AV is first required to derive an accurate model, before designing a navigation controller. Then, a novel, robust nonlinear controller for the longitudinal / lateral flight dynamics of a UC^2AV is presented. The controller consists of a dynamic inversion inner-loop and a μ-synthesis outer-loop controller. Results demonstrate the efficacy of the proposed control scheme and the ability of the UC^2AV to adapt to challenging CC-on-demand scenarios. The proposed controller design may be generalized and applied to a family of nonlinear systems with unstructured uncertainties and time-varying parameters, going beyond addressing uncertainty challenges regarding the aircraft's aerodynamic coefficients.

---

* Πληροφορίες: Καθ. Γ. Φούρλας (email: gfourlas@uth.gr)

Short Biography

Dr. *Kimon P. Valavanis* is John Evans Professor, Department of ECE, D. F. Ritchie School of Engineering and Computer Science, University of Denver. He is Guest Professor in the Faculty of Electrical Engineering and Computing, University of Zagreb, Croatia. He also had a Visiting Appointment at Politecnico di Torino, Dipartimento di Ingegneria Meccanica e Aerospaziale, DIMEAS. His research interests span Unmanned Systems, Distributed Intelligence Systems, Robotics and Automation. He has published more than 450 book chapters, technical journal, and transaction, referred conference, and invited papers. He has authored/co-authored/edited 19 books. He has graduated 38 PhD students and more than 100 M.Sc. students.

Dr. Valavanis served as Editor-in-Chief of the IEEE Robotics and Automation Magazine from 1996-2005, and since 2006, of the Journal of Intelligent and Robotic Systems, Springer. He also serves as co-chair of the IEEE-RAS Aerial Robotics and Unmanned Aerial Vehicles Technical Committee since 2008. He has founded the International Conference on Unmanned Aircraft Systems, which he runs annually.

He was a Distinguished Speaker in the IEEE Robotics and Automation Society, a Senior Member of IEEE, a Fellow of the American Association for the Advancement of Science, a Fellow of the U.K. Institute of Measurement and Control, and a Technical Expert of the NATO Science and Technology Organization (STO). In August of 2021, he was appointed to the NATO STO Technical Team of SAS-ET-EX on "Integration of Unmanned Systems into Operational Units" for the duration of the Program of Work. He was selected to serve as NATO Technical Evaluator for the AVT-353 Workshop on '*Artificial Intelligence in the Cockpit for UAVs*' that took place in Torino, Italy, in April 2022. He is also a Fulbright Scholar (*Senior Lecturing & Research Award*).