



Department of Electrical and Computer Engineering

Title: Fault-tolerant control allocation: application to icing detection and recovery in overactuated UAV

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Room 101 Building 3 (ΚΟΔ03-101, Κέντρο Κοινωνικών Δραστηριοτήτων)
New Campus - University of Cyprus

Abstract:

The main objective of control allocation is to determine how to generate a specified control effect from a redundant set of actuators and effectors. Due to input redundancy, several configurations leading to the same generalized force are admissible and for this reason the control allocation scheme commonly incorporates constraints and additional secondary objectives, such as power or fuel consumption minimization. One further advantage of actuator and effector redundancy is the possibility to reconfigure the control in order to cope with unexpected changes on the system dynamics, such as failures or malfunctions: in particular if the set of actuators and effectors is partially affected by faults, one can modify the control allocation scheme by preventing the use of inefficient/ineffective devices in the generation of control effect or compensating for the loss of efficiency.

The aim of our research project is to investigate the application of the aforementioned control allocation techniques to the problem of icing diagnosis/recovery in overactuated unmanned aerial vehicles. Detection and accommodation of ice adhesion on wings, control surfaces and sensors is a fundamental issue, since the ice accretion modifies the shape of the aircraft and alters the measurements. this causing changes on aerodynamic forces and reducing manoeuvring capabilities.

Biography:

Dr. Andrea Cristofaro has received the M.Sc. in Mathematics from University of Rome La Sapienza (Italy) in 2005 and the PhD in Information Science and Complex Systems from University of Camerino (Italy) in 2010. Between 2010 and 2013 he has been first with eMotion research team, INRIA Rhone-Alpes, Grenoble (France) and then with Department of Mathematics, University of Camerino (Italy). He is currently a ERCIM post-doc research fellow at the Department of Engineering Cybernetics, Norwegian University of Science and Technology and Center for Autonomous Marine Operations and Systems (AMOS), Trondheim (Norway). His research interests include: constrained and robust control, filtering and estimation methods, optimization, control allocation, autonomous vehicles, control of partial differential equations.