

UNIVERSITÀ DEGLI STUDI DI NAPOLI FEDERICO II

PHD PROGRAM IN
INFORMATION TECHNOLOGY AND ELECTRICAL ENGINEERING

Seminar announcement

Wednesday 27 April 2022, Time: 08:30 - 10:30

Room T4, Floor 0, Building 1- Via Claudio, 21 - NAPOLI - (TEAMS Code: [jiqn63a](#))



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On using simple optimization techniques for tuning of UAVs

Abstract: During the seminar, a novel autotuning approach for finding locally-best parameters of controllers on board of unmanned aerial vehicles (UAVs) will be presented. The controller tuning is performed fully autonomously during flight on the basis of predefined ranges of controller parameters. Required controller properties may be simply interpreted by a cost function, which is involved in the optimization process. For example, the sum of absolute values of the tracking error samples or performance indices, including weighed functions of control signal samples, can be penalized to achieve very precise position control, if required. The

proposed method relies on a zero-order optimization search technique fitted into bootstrap sequences, enabling one to obtain a global minimizer for a unimodal cost function. The approach is characterized by an extremely low computational complexity and does not require any UAV dynamics model (just periodical measurements from basic onboard sensors) to obtain proper tuning of a controller. In addition to outlining the complete, and yet simple, theoretical background of the method, an experimental verification in real-world outdoor conditions will be provided with relation to multiple experiments, applications and results.

Lecturer short bio: *Member, IEEE, received the M.Sc. degree from Poznan University of Technology, in 2002, and the Ph.D. degree in 2005, and D.Sc. degree in 2013 from the same University, respectively. Since 2020 he is an associate professor of PUT. He was a Visiting Scholar with the University of Madrid, FCT Nova in Lisbon, and Czech Technical University in Prague. He is the (co)author of 60+ publications in peer-reviewed conferences, 20+ publications in impacted journals and 40+ papers in the other journals. He focuses on using control or optimization techniques, optimal, adaptive or robust control methods, developing linear matrix inequality conditions for anti-windup compensation, and tuning problems. He was a member of UPM-UPO-PUT team in the MBZIRC 2020 robotic competitions (Abu Dhabi) where they scored the third place in the Grand Challenge.*

For information: Fabio Ruggiero, PhD (DIETI, UniNA) – fabio.ruggiero@unina.it (organizer)