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IEEE Miami Section Seminar Announcement

"In-flight tuning of UAVs controllers - from idea to patent protection"

Wednesday, April 24, 2024 | 2:00 PM EST
Location: EC 3930, 10555 W Flagler St, Miami, FL 33174

Zoom - Meeting ID: 842 3782 5268| Passcode: Dav3Nv

Dr. Wojciech Giernacki
Associate professor, the Institute of Control, Robotics and Information Engineering of the Poznan University of Technology, Poland

Summary: With an increasing number of multirotor unmanned aerial vehicles (UAVs), solutions supporting the improvement in their precision of operation and safety of autonomous flights are gaining importance. They are particularly crucial in transportation tasks, where control systems are required to provide a stable and controllable flight in various environmental conditions, especially after changing the total mass of the UAV (by adding extra load). In this presentation, the problem of using only available basic sensory information for fast, locally best, iterative real-time auto-tuning of parameters of fixed-gain altitude controllers is considered. The machine learning method proposed for this purpose is based on a modified zero-order optimization algorithm (golden-search algorithm) and bootstrapping technique. It has been validated in numerous simulations and real-world experiments in terms of its effectiveness in such aspects as: the impact of environmental disturbances (wind gusts); flight with change in mass; and change of sensory information sources in the auto-tuning procedure.

Speaker Bio: Wojciech Giernacki, Ph.D., D.Sc. (Eng.), Associate Prof. received the Ph.D. degree in control engineering and robotics from the Poznan University of Technology in 2011 and D.Sc. in 2019. He founded and heads the PUT AeroLab and Unmanned Aerial Vehicles Research Group, as well as the Division of Control and Optimization at the Institute of Robotics and Machine Intelligence. His scientific interests are focused around the issues of UAVs, especially robust and adaptive control, optimization techniques, as well as data fusion from sensors.

For more information, please contact:
Mr. Mustafa Esoofally, Web Master, IEEE Miami Section, muesoofa002@fiu.edu