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Model-based Autonomous Marine Vehicle Navigation and Control

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ABSTRACT:

Achieving autonomous robot motion control and navigation in the marine domain is particularly challenging compared to other field robotics deployment spaces, in no small part due to the harsh nature of the robot's workspace, the presence of disturbances, and the uncertainty associated with the ambient environment dynamics as well as that of the system itself. These challenges, however, should not discourage principled model-based control design approaches in favor of more heuristic solutions that neither provide insights, nor afford formal guarantees, nor transfer between platforms. In this talk we will explore how environmental observation tasks motivate and inform nonlinear control design frameworks for regulating motion in autonomous marine robots on the water surface, and lay foundations for agile 3D subsurface motion control.

BIOGRAPHY:

Dr. Herbert Tanner received his Ph.D. in mechanical engineering from the NTUA, Athens, Greece, in 2001. He was a postdoctoral researcher at the University of Pennsylvania from 2001 to 2003, and subsequently took a position as an assistant professor at the University of New Mexico. In 2008 he joined the Department of Mechanical Engineering at the University of Delaware, where he is currently a professor and department chair. In 2019 he was appointed Director of the Center for Autonomous and Robotics Systems. Tanner's research interests range from multi-robot system planning and control, flocking and swarming, constrained navigation, heterogeneous agent coordination, and hybrid systems, with application domains that span a diverse range from radiation detection, to pediatric rehabilitation and marine robotics. He received NSF's Career award in 2005, he is a fellow of the ASME, and a senior member of IEEE. He has served in the editorial boards of the IEEE Transactions on Automatic Control, the IEEE Robotics and Automation Magazine and the IEEE Transactions on Automation Science and Engineering, Automatica, and Nonlinear Analysis Hybrid Systems. He is currently a chief specialty editor for Frontiers in Robotics and AI: multi-robot systems. He has also been serving in several conference editorial boards of both IEEE Control Systems and IEEE Robotics and Automation Societies.