MAE Seminar SERIES

THURSDAY,
MAY 9
3:30 PM
114 HOCHSTETTER

Dr. Maurizio Porfiri

Professor (Ph.D.)

Mechanical and Aerospace Engineering and Biomedical Engineering

Tandon School of Engineering
New York University

WHEN ZEBRAFISH MET ENGINEERING

ABSTRACT

Zebrafish are gaining momentum as the third millennium laboratory species for the investigation of several functional and dysfunctional biological processes in humans, including the fundamental mechanisms modulating emotional patterns, learning processes, and individual and social response to alcohol and drugs of abuse. Dynamical systems and robotics offer a powerful range of theoretical and experimental approaches that can advance our understanding of this animal model. In this talk, we report recent advances on: (i) the design of biomimetic robotic fish to elicit highly-controllable and customizable stimuli for laboratory experiments on zebrafish behavior; (ii) the formulation of a new data-driven modeling framework to study zebrafish behavior within unprecedented "in silico" experiments that can help reduce the number of animals in preclinical studies; and (iii) the integration of information-theoretic tools to unravel leader-follower interactions in groups of zebrafish and measure fear response to predators. The presentation is intended to expose neuroscientists to a toolbox of methodological innovations that can enhance their experiments, while offering engineers an overview of fundamental mathematical and technological advancements that can find applications beyond the study of zebrafish.

BIO SKETCH

Maurizio Porfiri is a Professor in the Department of Mechanical and Aerospace Engineering at New York University Tandon School of Engineering. He received M.Sc. and Ph.D. degrees in Engineering Mechanics from Virginia Tech, in 2000 and 2006; a "Laurea" in Electrical Engineering (with honors) and a Ph.D. in Theoretical and Applied Mechanics from the University of Rome "La Sapienza" and the University of Toulon (dual degree program), in 2001 and 2005, respectively. He is engaged in conducting and supervising research on dynamical systems theory, multiphysics modeling, and underwater robotics. Maurizio Porfiri is the author of approximately 300 journal publications and the recipient of the National Science Foundation CAREER award. He has been included in the "Brilliant 10" list of Popular Science and his research featured in major media outlets, including CNN, NPR, Scientific American, and Discovery Channel. Other significant recognitions include the elevation to IEEE Fellow in control systems; invitations to the Frontiers of Engineering Symposium and the Japan-America Frontiers of Engineering Symposium organized by National Academy of Engineering; the Outstanding Young Alumnus award by the college of Engineering of Virginia Tech; the ASME Gary Anderson Early Achievement Award; the ASME DSCD Young Investigator Award; and the ASME C.D. Mote, Jr. Early Career Award.

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