TEXAS TECH UNIVERSITY
Department of Mechanical Engineering

ME SEMINAR SERIES IN FALL 2013

An Overview of Research Topics Pursued at Virginia Tech in the Center for Dynamic Systems Modeling and Control

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Date: September 23, 2013 (Monday)
Time: 2:00pm-3:00pm
Venue: Livermore 101
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Abstract: About two years ago, the Center for Dynamic Systems Modeling and Control (DySMAC) was established in the Department of Mechanical Engineering at Virginia Tech. The center includes 11 Professors, about 30 graduate students, approximately 2000sf of shared lab space, plus additional lab spaces allocated to the individual faculty members. As the name of the center hints, the research areas pursued in the lab span many different fields, from robotics to vibrations, rehabilitation engineering to autonomous vehicles, and many more. Dr. Leonessa, founder and inaugural Director of DySMAC will highlight some of the research pursued in the center and will focus on some of the work that he has been more directly involved with, relating to the real-time simultaneous localization and mapping (SLAM) of a network of autonomous vehicles operating in unknown environments and utilizing inexpensive, off-the-shelf, sensor suites. All of the design aspects will be discussed, from the mechanical challenges, solved by senior students as part of their capstone design experience, to the software implementation and experimental validation.

Speaker Bio: Dr. Alexander Leonessa obtained his Bachelor of Science degree in Aeronautical Engineering from the University of Rome "La Sapienza," in 1993. After that he spent two years completing his military service as a Navy Officer and working for Alitalia Airlines as Aircraft Maintenance Supervisor. In 1995, Dr. Leonessa joined the School of Aerospace Engineering at Georgia Institute of Technology, Atlanta, Georgia, where he was conferred two M.S. degrees in Applied Mathematics and Aerospace Engineering, as well as a Doctoral degree in Aerospace Engineering. His research focused on the development of a hierarchical nonlinear robust control framework that provides a rigorous alternative to designing gain scheduled feedback controllers for general nonlinear systems. All the results obtained under this work constituted original research and are documented in his book "*Hierarchical Nonlinear Switching Control Design with Application to Propulsions Systems*" (published by Springer-Verlag, 2000). His appointment as a faculty member at Virginia Tech started in 2007, after two previous similar appointments at Florida Atlantic University and the University of Central Florida. His research and contributions include (i) control theory with application to autonomous vehicles guidance and navigation, (ii) nonlinear system identification with application to health monitoring, (iii) real-time embedded control with application to system design of robotic systems, and (iv) functional electrical stimulation of muscles for rehabilitation of stroke survivors and patients with spinal cord injuries. In particular, the dominant idea in his research effort is that most real-world physical systems are too complex to accurately model, hence model uncertainties must be accounted for in the control system design process using some kind of self-learning procedure.