UNIVERSITY OF CENTRAL FLORIDA

MECHANICAL AND AEROSPACE ENGINEERING

Announcing MAE Spring 2013 Seminar Series

Friday, March 29, 2013, 2:00pm-3:00pm, CL 1, Room 320

This event is hosted by the College of Engineering and Computer Science and the Mechanical and Aerospace Engineering Department at the University of Central Florida

"Wings & Wind: Some thoughts on Aeroelastic Energy Harvesting"

Date:
Friday, 03/29/2013

Time:
2:00pm—3:00pm

Location:
CL 1, Room 320

For more information please contact:

Dr. Tina Tian at Tian.Tian@ucf.edu

www.mae.ucf.edu

Dr. Ephrahim Garcia
Professor of Mechanical and Aerospace Engineering
Laboratory for Intelligent Machine Systems
Sibley School of Mechanical and Aerospace Engineering
Cornell University

Abstract - Wind power has been in the mind of Europeans for many centuries. In the vast, Iberian *la mancha* plains it was utilized for grist mills when water power was scarce, and by the Dutch in littoral areas for the management of hydrology. Our interest in wind is not that of steady flows, which has been readily available and employed by many cultures for centuries. In this work we want to take advantage of the unsteady nature of wind and how it interacts with structures. These interactions can lead to aeroelastic phenomena, or flutter, something often avoided in engineering design. We propose to exploit this aeroelastic phenomenon to generate power. A key element of this work is the development of low order models that capture the characteristics of structural systems interacting with the flow. We will discuss the predictive nature of the model for a single element in the flow. Experiments will be reported on that investigated the performance of multiple elements and their interactions.

Bio - Dr. Garcia is a Professor at Sibley School of Mechanical and Aerospace Engineering at Cornell University. He earned a doctoral degree from the State University of New York at Buffalo in Aerospace Engineering. He is the Director of the Laboratory for Intelligent Machine Systems. This group performs research in smart material systems and structures as applied to aerospace structural systems, energetics, bio-inspired robotics and precision motion controls. Dr. Garcia is an advisor to various student project teams including the DARPA Grand Challenge, Urban Challenge, Design/Build/Fly and the CU Mars Rover. He teaches courses in engineering design, flight dynamics, aerodynamics, vibrations and mechatronics.

Previously, Dr. Garcia was Program Manager at the Defense Advanced Research Projects Agency. He was instrumental in developing multidisciplinary programs based on subjects as diverse as advanced materials, structures, controls, power electronics, devices, energetics, mechanics, human kinematics, human physiology, and power converters. He developed multiple programs at DARPA including Smart Materials and Actuators, Compact Hybrid Actuators, Exoskeletons for Human Performance Augmentation, and Morphing Structures programs.

In addition, Dr. Garcia founded Dynamic Structures and Materials, LLC, a company that utilizes smart materials to create precision motion control devices. Prior to DARPA, Dr. Garcia was Associate Professor in the Department of Mechanical Engineering at Vanderbilt University.