Invitación a Conferencias. Octubre 2009

Jose Ceroni, Presidente del Capítulo IEEE Chile *de* Systems, Man and Cybernetics, invita a Ud. a asistir a las Conferencias que dará Dr. Donald Brown en Chile.

October 14 11:00 Lecture Dr Donald Brown: Learning from Simulations. Segundo Congreso IEEE Nuevas Tecnologias en Ingenieria Electrica y Electronica. Pontificia Universidad Católica de Valparaíso, Auditorio Edificio ICB, Avenida Brasil 2147, Valparaíso. http://pucv.sb.ieeechile.cl/, Contacto: JCeroni@ucv.cl

October 14 16:00 Lecture Dr Donald Brown: Learning from Simulations Universidad de Santiago de Chile, USACH, Departamento de IngenieríaEléctrica. Contacto hector.kaschel@usach.cl

October 15 16:00 Lecture Dr Donald Brown: Learning from Simulations.
Universidad de Talca, Facultad de Ingeniería. Salón Auditorio del Campus. Curicó.
Contacto: Mario Fernandez: mafernandez@utalca.cl

October 16 12 :00 Lecture Dr Donald Brown: Learning from Simulations.
Universidad Andres Bello, Aula Magna, Avenida República
Contacto: Carolina Lagos clagos@unab.cl

Gastón Lefranc, Presidente del Capítulo IEEE Chile *de* Control Systems, invita a Ud. a asistir a las Conferencias que dará Dra. Lucy Pao en Chile.

October 13 11:00 Lecture Dra Lucy Pao: A Tutorial on the Dynamics and Control of Wind Turbines and Wind Farms. Segundo Congreso IEEE Nuevas Tecnologias en Ingenieria Electrica y Electronica. Pontificia Universidad Católica de Valparaíso, Auditorio Edificio ICB, Avenida Brasil 2147, Valparaíso. http://pucv.sb.ieeechile.cl/, Contacto: glefranc@ucv.cl

October 14 12:00 Lecture Dra Lucy Pao: Combined Feedforward/Feedback Control of Flexible Structures, with Applications Ranging from Atomic Force Microscopes to Megawatt Wind Turbines". Universidad de Santiago de Chile, USACH, Departamento de IngenieríaEléctrica. Contacto hector.kaschel@usach.cl

October 14 16:00 Lecture Dra Lucy Pao: Haptic Interfaces: Making Touch Interfaces More Interactive. Universidad Andres Bello, Aula Magna, Avenida República. Contact: Carolina Lagos clagos@unab.cl

Donald E. Brown

Dr. Brown is W.S. Calcott Professor and Chair of the Department of Systems and Information Engineering, University of Virginia. He is a Fellow of the IEEE and the Editor-in-Chief of the IEEE Transactions on Systems, Man, and Cybernetics, Part A: Systems and Humans. He is the recipient of the IEEE Norbert Wiener Award, the IEEE Intelligence and Security Informatics research achievement award, and the IEEE Millennium medal.

Dr. Brown received a Ph.D. from the University of Michigan in Industrial and Operations Engineering. He does research in data fusion, statistical learning, and behavior discovery and simulation with applications to security and safety

Learning from Simulations

Donald E. Brown
Department of Systems and Information Engineering University of Virginia

Abstract: Simulations have become the primary means for modeling and analyzing complex systems. They are used in areas such as medicine and biomechanics to model organs, as well as, for air frames to analyze design improvements through the use of finite elements. Agent-based simulations have become particularly useful as way to analyze complex systems. While simulations have proven their worth in a variety of domains, their popularity has created new requirements to analyze and manage the large amounts of data they produce. This presentation describes new methods for using data mining and knowledge discovery techniques to learn from simulations. The new approach extends response surface methodology to enable learning from simulations, particularly agent-based simulations, where the number of control variables can be quite large. Traditional response surface methods are limited in the number of variables they can handle and the types of models that can be developed. We show that the extended response surface techniques can dramatically increase the number of variables that can be modeled and that data mining techniques such as tree-based regression and splines can create non-linear fits that enable function approximation across large regions of interest. Finally, we combine data mining with search techniques to optimize or improve the performance of the system under study. As an additional benefit the extended response surface methodology provides a new approach to validating simulations. This presentation will cover both theoretical and practical aspects of extended response surface methods for learning from simulations, and will demonstrate the use of the method in conjunction with an agent-based simulation of first responders in an emergency medical situation.

Lucy Pao

Lucy Y. Pao received the B.S., M.S., and Ph.D. degrees in Electrical Engineering from Stanford University, and she is currently a Professor in the Electrical and Computer Engineering Department at the University of Colorado at Boulder. She has interests in the areas of control systems (with applications to flexible structures, disk drives, tape systems, wind turbines, atomic force microscopes, and power systems),multisensor data fusion (with applications to unmanned autonomous vehicles, satellites, and automotive active safety systems), and haptic and multimodal visual/haptic/audio interfaces (with applications to scientific visualization and spatial communication).

Professor Pao has received a number of awards and has been active in many professional society committees and positions. Selected recent awards include a 2003 Subaru Teaching Excellence Award, the Best Commercial Potential Award at the 2004 International Symposium on Haptic Interfaces for Virtual Environments and Teleoperator Systems, and the Best Paper Award at the 2005 World Haptics Conference. She was also a plenary speaker at the 2006 IEEE Conference on Decision and Control. Selected recent and current professional society activities include serving as Program Chair for the 2004 American Control Conference (ACC), an elected member of the IEEE Control Systems Society Board of Governors for 2005-2007, and a member of the 2008 IFAC Congress Young Author Prize Selection Committee. She is on the Organizing Committee for the 2010 IFAC Symposium on Mechatronic Systems, and she will also be General Chair for the 2013 ACC.

LECTURES

Talk 1:
Tutorial on the Dynamics and Control of Wind Turbines and Wind Farms

Abstract:
Wind is recognized worldwide as a cost-effective, environmentally friendly solution to energy shortages, and wind energy is currently the fastest-growing energy source in the world. Despite the amazing growth in the installed capacity of wind turbines in recent years, engineering and science challenges still exist. These large, flexible structures operate in uncertain environments and lend themselves nicely to advanced control solutions. Advanced controllers can help achieve the overall goal of decreasing the cost of wind energy by increasing the efficiency, and thus the energy capture, or by reducing structural loading and increasing the lifetimes of the components and turbine structures.

This talk will provide a broad overview of wind energy systems. We will describe the main components of wind turbines, the sensors and actuators, the different operating regions, and we will outline the current state of the art in wind turbine modeling and control. We will also highlight growing areas of importance and areas of future work, including combined feedforward and feedback control of wind turbines using novel sensing technologies, wind turbine wake modeling and coordinated control of arrays of turbines on wind farms, and modeling and control of floating offshore wind turbines.

Talk 2:
Combined Feedforward/Feedback Control of Flexible Structures, with Applications Ranging from Atomic Force Microscopes to Megawatt Wind Turbines

Abstract:
In the past, manipulators, machine tools, measurement and many other systems were designed with rigid structures and operated at relatively low speeds. With an increasing demand for fuel efficiency, smaller actuators, and speed, lighter weight materials are now often used in the construction of systems, making them more flexible. Flexible structures are also prevalent in space systems where lightweight materials are necessitated for fuel efficiency when carrying the structures into space. Achieving high-performance control of flexible structures is a difficult task, but one that is now critical to the success of many important applications, ranging from the shuttle remote manipulator system, satellites, wind turbines, robot manipulators, gantry cranes, disk drives, to atomic force microscopes. The unwanted vibration that results from maneuvering a flexible structure often dictates limiting factors in the performance and lifespan of the system.

We will discuss combined feedforward and feedback architectures and algorithms for controlling flexible structures. Depending upon the particular performance goals, such as tracking accuracy in a trajectory following task or rapid settle time for a point-to-point motion, there are different requirements for the controller. In many applications, the actuators and sensors are separated by the flexible structure, leading to nonminimum phase characteristics that are challenging for control. Over the last few decades, many feedback and feedforward control methods have been developed for flexible structures. We will overview and compare several of these control methods and highlight recent developments and results. We will also present advances in a few application areas that have been achieved through better control of inherent flexible structures. Finally, we shall close by discussing a number of future challenges.

Talk 3:
Haptic Interfaces: Making Touch Interfaces More Interactive

Abstract:
Haptic interfaces enable users to feel, touch, and manipulate remote or virtual objects, and as such, haptic interfaces can facilitate human-computer and human-machine interaction in a wide range of applications ranging from scientific visualization to teleoperation to laparoscopic surgery. In this talk, we will give examples of haptic interfaces from around the world, including those we have developed in our own lab. Limitations and capabilities of current haptic interfaces will be discussed. We will also outline a number of applications of haptic interfaces, ranging from low-end applications (vibrotactile mice, joysticks) to high-end applications (medical/rehabilitation, scientific visualization). Throughout the talk, we will highlight some of our work in two areas: (1) investigating the use of haptic interfaces for scientific visualization of complex multi-dimensional data, as well as (2) developing low-cost yet high-quality multi-degree-of-freedom haptic interfaces in the hopes of expanding haptic interfaces to an even broader range of applications.