High School Students & Teachers Workshop on The Power, Beauty and Excitement of the Cross-Boundaries Nature of Control, Madrid, 20 June 2006

Date: 20 June 2006 (Tuesday)

Time: 09:00 - 16:00

Place: Escuela Técnica Superior de Ingenieros Industriales Universidad Politécnica de Madrid c/ José Gutiérrez Abascal 2, 28006 Madrid

Workshop Organisers:

* Technical Committee on Education of the International Federation of Automatic Control (IFAC)

* Technical Committee on Education of the Control Systems Society, the Institute of Electrical and Electronics Engineers (IEEE)

* Comité Español de Automática (CEA)

Program and Speakers:

The Workshop aims to inspire interest from youth towards studies in Automatic Control and to assist high school teachers in promoting the discipline of Automatic Control among their students. It is composed of several short but effective presentations on various problems from the real world that have been solved by using control engineering methods, techniques and technologies. The attractiveness and excitement of choosing a career in control engineering will also be addressed. Live interaction between the presenters and the audience is to be an important feature of the Workshop.

09:00 - 09:45 Concepts, tools and common sense in basic control engineering courses

Pedro Albertos

Prof. of Automatic Control

Technical University of Valencia, Spain

Simulation, advanced computing technology and the intensive use of new technologies provide new challenges and opportunities in teaching Automatic Control, but there is a misunderstanding of basic and general concepts, hidden by huge amounts of data and prompt presentation of results.

This talk will review some of these basic concepts, such as feedback, delays, low order models, and sensitivity which should be always kept in mind when designing the control, or analysing the behavior, of a dynamic system, and this should be emphasized in control courses.

09:45 - 10:30 Future Careers in Mechatronics and Control Systems

Mark Spong

Donald Biggar Willett Professor of Engineering

University of Illinois at Urbana-Champaign, USA

Mechatronics is the synergistic combination of precision mechanical engineering, electronic controls and systems engineering in the design of products and processes. Mechatronic Systems are "smart systems" of all kinds including robots, drive-by-wire cars, fly-by-wire airplanes, and consumer electronics. This talk will give examples of advances in control systems and mechatronics and discuss career opportunities for students in these areas.

10:30 - 11:00 Refreshments

Break for refreshments with presenters, control scientists and engineers mingling with the attendees in informal chats.

11:00 - 11:45 Bicycles

Karl Astroem

Professor Emeritus, Lund University, Sweden

Bicycles

Bicycles are a very efficient transportation system but they are also clever interesting control systems which will be explained in the lecture. Suggestions for simple experiments that can be preformed using very simple means will also be given.

11:45 - 12:30 "Ejs - A freeware, open-source tool to create web-based virtual control laboratories"

Sebastian Dormido

Professor

Escuela Técnica Superior de Ingeniería Informática

Universidad Nacional de Educación a Distancia

Hands-on laboratory exercises are important in control education because they help the students to make the intellectual transition from theory to practice. The advent of

the Internet and other advanced information technologies, however, suggest that web-based and interactive virtual labs can provide a real alternative to the traditional lab. In this talk we shall explore the use of Easy Java Simulations (Ejs) to create web based virtual control labs containing interactive dynamic simulations. Several case studies are discussed in order to illustrate the virtual-lab implementation using Ejs.

12:30 - 13:00 Panel Discussion

Panel discussion through interaction with the audience (Moderators: Professor Pedro Albertos and Professor Sebastian Dormido)

13:00 - 14:00 JOINT LUNCH AND INFORMAL CHATS

14:00 - 14:45 Random Walk Around Some Stochastic Control Problems in Telecommunication, Finance and Medicine

Bozenna Pasik-Duncan

Professor

Mathematics Department and Information and Telecommunication Technology Centre

University of Kansas, Lawrence, Kansas, USA

The modern world is full of randomness and noise (Can we ignore noise?). This lecture will focus on modelling different types of noise in systems. We will take a random walk around some stochastic adaptive control problems in telecommunication and finance industries as well as in medicine, in particular epilepsy. We will observe that real world problems have become more and more complex and have generated the need for development of new exciting stochastic calculus. We will conclude that the partnership of mathematics and control engineering, and collaborative effort in research are necessary for success in solving these problems.

14:45 - 15:30 Cooperative Driverless Vehicles

Ljubo Vlacic

Professor and Director

Intelligent Control Systems Laboratory

Griffith University, Brisbane, Australia

The idea of intelligent vehicles has brought with it promises of heightened safety, reliability and efficiency. No longer would the onus of responsible driving be placed on fallible humans, in fact, the very idea of a car crashing, or causing damage to someone would be completely alien and unthinkable. Congestion would entirely evaporate as computers took control of vehicles and decided the optimal route for greatest efficiency. While this seems extremely idealistic, there is an element of truth

to these benefits that intelligent vehicle technologies can provide. Thanks to the most recent development of decision and control algorithms intelligent vehicles are now even capable of undertaking driving manoeuvres in cooperation with each other. This talk will address intelligent vehicle technologies and give examples of cooperative driverless vehicles for cities.

15:30 - 15:45 Panel Discussion

Panel discussion through interaction with the audience (Moderators: Professor Pedro Albertos and Professor Sebastian Dormido)

15:45 - 16:00 Wrap-up

Professor Bozenna Pasik-Duncan and Professor Ljubo Vlacic
