IFAC International Federation of Automatic Control

1992 No. 2 April Newsletter

Contents:

IFAC Council and Related Meetings 1992
19 - 24 May, 1992, Malaga, Spain
held in conjunction with the
IFAC Symposium on Intelligent Components and Instruments for Control Applications (20-22 May, 1992)

The Comite Español de La IFAC, the Spanish NMO of IFAC, has invited our Federation to hold its annual Council- and Related Meetings in Malaga, Spain, in conjunction with the IFAC Symposium on Intelligent Components and Instruments for Control Applications (20-22 May, 1992).

One of the most important subjects of this year's consultations will be the discussion of the future publications policy of IFAC. Further very significant discussions will deal with the potentially new structure of the Technical Board which must be IFAC's answer to the changing world and the challenges of the forthcoming years.

The various executive committees of IFAC as well as the IFAC Council will deal with the changes in the world and in particular also in Europe, and the possible impact this will have and has already had on the Federation. There is the great likelihood that some new National Member Organizations from the fledgling democracies will soon apply for membership in IFAC.

Further, the IFAC Council will this year take the very important decision on the Congress venue in 2002. The Elections Committee will meet and discuss the slate of candidates for the 1993-96 triennium.

Before the Council, there will be meetings of various Technical Committees and Executive Committees, of the Executive Board and the Technical Board.

We are looking forward to these meetings in Spain and will report on the results achieved and the experience gained in one of the next issues of this Newsletter.

Gusztáv Hencsey, IFAC Secretary
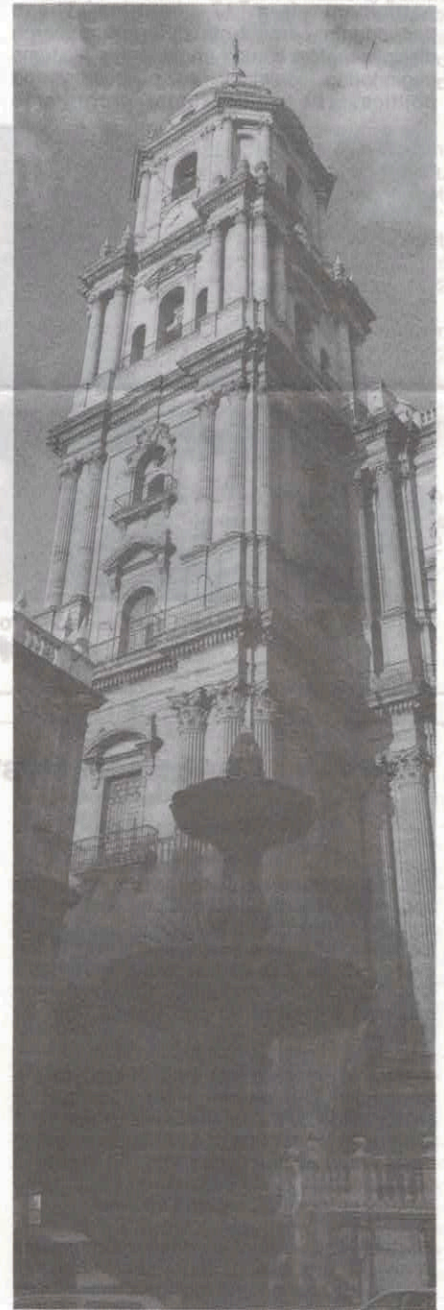
Manquita Cathedral, Malaga

Cultural Aspects of Automation - CAA'91
IFAC Workshop
October 16-18, 1991, Krems, Austria

Austria has a long tradition in interdisciplinary research in IFAC. For example in 1983 the first IFAC Workshop on 'Supplemental Ways for Improving International Stability' was organized in Laxenburg near Vienna. On that occasion the IFAC Working Group on SWIIS was founded. During the last IFAC Congress in Tallinn the Committee on Social Effects of Automation installed a new Working Group on 'Cultural Aspects of Automation' and the Austrian NMO suggested to have the first Workshop on this topic in Austria.

According to one of the main goals of the Scientific Academy of Lower Austria in Krems this Workshop took place there. The organizer, the 'Austrian Center for Productivity and Efficiency' (as the Austrian NMO) and the Department of 'Systems Engineering and Automation' of the Academy welcomed 41 participants from 17 countries. These participants came from different research disciplines, like control engineering, systems engineering, sociology, art, philosophy and politics. The international programme committee, chaired by Jan Forslin, Norway, had to select from 47 abstracts. Finally 25 papers were accepted.

These papers served only for initiating intensive discussions. Main topics of these discussions were technology design, automation software and culture, social conditions, education, computer and art, design of man-machine systems, CIM and culture as well as appropriate methods for interdisciplinary research. Because of the presence of approximately 50 % of the participants from Eastern cultures there was a special emphasis on the influence of automation on different cultures, in particular in the East and the West. As a first result of this Workshop, one of the next tasks of the new Working Group should be the design, development and construction of automation devices particularly considering the cultural aspects.

This first Workshop fulfilled the main goal for scientists of different research disciplines to define a common vocabulary when working together on research projects.

Prof. Kopacek, Dr. Rozsenich, Prof. Forslin, Dr. Brantner (left to right)
at the opening session

Discrete Events System Theory and Application to Manufacturing and Social Phenomena
IFAC Workshop
25-27 June, 1991, Shenyang, China, P.R.

The idea to organize an IFAC workshop on DEDS was proposed by some active DEDS scientists in 1988. They hoped to have more chances to exchange their research experiences and to promote this area. A proposal for this workshop was then submitted to IFAC and finally approved in 1990. The workshop was sponsored by the IFAC TC on Mathematics of Control, co-sponsored by the TC on Manufacturing Technology and organized by the Chinese Association of Automation and the Northeast University of Technology.

There were more than 70 engineers, professors and students to attend this workshop. They came from the USA, the USSR, Japan and China. 60 papers were presented. The topics included DEDS modelling via various approaches (formal language, automata, Petri Nets, max-algebra, queuing network), studies on system dynamics, perturbation analysis and optimization, as well as many issues on control simulation and application to manufacturing systems. It was very significant that many control engineers participated in the workshop. This shows the high interest DEDS has been attracting, and in particular the question of how to develop DEDS to meet practical requirement. It is a mark of DEDS to go to practice.

The workshop was on a very high level and turned out to be a very successful IFAC event. Many of the presentations were highly appreciated and considered to be main contributions of this workshop to the history of DEDS. In my personal opinion these contributions were
1. Optimization and knowledge based job shop scheduling system, presented by Peter B. Luh.
2. Concurrent control of a class of discrete event systems described by controlled Petri Nets, presented by Chen Haixin and Hu Baosheng.
3. Modelling and scheduling of FMS using time stochastic Petri Nets, presented by Hiroyuki Tamura.

Jian Xinsong
TC on MANTECH

Expert Systems in Mineral and Metal Processing
IFAC Workshop
August 26-28, 1991, Espoo, Finland

The Workshop concentrated on expert systems applied to mineral and metal processing. The number of delegates, which was higher than expected, proved a successful timing of the event. In spite of its narrow scope and today's low international economy, the Workshop collected a total of 98 participants from 23 countries.

A total of 58 abstracts was offered to the workshop. The papers were selected for presentation by the International Programme Committee consisting of 15 members, on the basis of the abstracts received. An accepted paper had to include both expert system and mineral or metal processing material.

The technical sessions covered expert systems in mineral processing, iron and steelmaking, continuous casting and rolling as well as new methods. Full texts of all papers were distributed to the participants, some of them in draft form. All papers were presented by the author or in a few cases by a substitute speaker and submitted to discussion. Two tutorial courses on expert systems and neural networks were organized separately, one before and one after the workshop.

There were several important topics: Applications of expert systems especially to the iron and steel industry as well as neural networks. The amount of the expert systems applications in the mineral and metal industry has increased rapidly during the last years but is still relatively low. Especially neural networks are an object of intensive research and development work at the moment. Integration of expert systems with deficiently known model complex processes is in process. The field of mineral and metal processing was quite evenly covered by the papers presented

E. Saarelainen
NOC Chairman
A. Niemi
IPC Chairman

E. Saarelainen, NOC Chairman
Opening Address

TC on Components and Instruments

This Technical Committee currently consists of about 35 members coming from appr. 20 different countries. The Chairman of this Committee for the 1990-93 triennium is Prof. Pedro Albertos (Spain) (cf. Who is Who on page 4). The Vice Chairmen are Profs. Alessandro de Carli (Italy), Hans Fuchs (Germany), Ülo Jaaksoo (Estonia), Qin-Wei Wu (China, P.R.).

Large scale integration technologies continuously move further the frontier between components and instruments, allowing today built-in systems to be considered as components of larger systems or as the complete control system. The design of components and instruments requires more sophisticated techiques, similar to those in use for control systems design.

The general scope as given in the IFAC Information Brochure (edition 1990) is: The Committee's interests and activities span all components and instruments which are used in automation and automatic control systems. These include sensors, transducers, controllers, actuators, instruments for process analysis and many special components. Computers may be considered as components in many control and measurement applications, but are excluded from the scope of the Committee. However 'intelligent' components and instruments which result from coupling and embedding microprocessors and other circuits into otherwise conventional components are included.

The growing activity of the TC recommended a more flexible structure. Mainly based on the topics of the TC events, both the already sponsored and well established ones, and those newly proposed, four Working Groups have been established.

WG on Low Cost Automation (Chairman: Prof. P. Kopacek, Austria)
Scope: The analysis of possibilities of techniques, design procedures, components and instruments to get a low cost automation not only considering all economic aspects but also improvement in productivity, reliability, flexibility and ease of application. Evaluation of benefits of automation by introducing suitable control strategies and devices without relevant modifications of the whole system of the productive process.

Currently the main activity of the Working Group is the preparation of the third IFAC Symposium on Low Cost Automation (LCA '92) which will be held in Vienna, September 9-11, 1992. After the events in Valencia and Milan, special emphasis will be on control problems in small and medium size companies. The industries of many countries are dominated by such enterprises. In them there is a great demand for intelligent and advanced but on the other hand low-cost devices. The development of such devices requires a lot of theoretical background. Therefore the main objective of these events is to bring together end-users and control system specialists in the field. According to the geographical position of Austria, a lot of problems arising now in the former Eastern Bloc countries will be discussed.

WG on Intelligent Components and Instruments (Chairman: Prof. A. Ollero, Spain)
Scope: The study of techniques, components and instruments taking advantage of some kind of artificial intelligence, or being part of an intelligent control system. Components and instruments employing software and hardware to implement advanced control strategies and intelligent functions, such as self-diagnosis and calibration. Areas of interest are large scale integration of electronic and mechanical devices, sensor fusion and perception, intelligent power level components and many application fields such as motion control, robotics and process control.

The main activity of the Working Group until the Sydney Congress will be the organization of the Symposium on Intelligent Components and Instruments for Control Applications (SICICA '92) to be held in Malaga (Spain), May 20-22, 1992.

WG on Electromechanical Components for Motion Control (Chairman: Prof. A. De Carli, Italy)
Tentative Scope: The study of components and techniques for motion control: Conventional and advanced motion control, analysis of mechanisms and mechanical devices, electrical actuators, motion control specifications, acceleration/torque/force/position control, vision based motion control, transducers and integrated motion control systems.

WG on Hydraulic and Pneumatic Components and Systems (Chairman: Prof. K. Reid, USA)
Tentative Scope: To examine modern developments in such a class of components and systems: a) Intelligent actuators, pumps, and control valves, with a particular reference to their use as system building blocks. b) Advanced techniques in system design for instance by the use of expert systems for circuit design and failure diagnosis.

Mainly under the auspices of the four Working Groups, the TC on Components and Instruments is sponsoring the following events in 1992:
IFAC Symposium on Intelligent Components and Instruments for Control Applications, SICICA '92, Malaga, Spain, 20-22 May, 1992.

IFAC Symposium on Low Cost Automation, LCA'92, Vienna, Austria, 9-11 September, 1992.

IFAC Workshop on Motion Control for Intelligent Automation, Perugia, Italy, 28-29 October, 1992.

IFAC Workshop on Trends in Hydraulic and Pneumatic Components and Systems, Anaheim, CA, USA, 11-13 November, 1992.

Newly Approved Events

Title	Date	Place	Deadline	Further Information
IFAC Workshop Economic Time Series Analysis and System Identification	1-3 July 1992	Vienna Austria		Prof. M. Deistler, Inst. f. Ökonometrie & Systemtheorie TU Wien, Argentinierstr. 8/119 A-1040 Vienna, Austria
IFAC Workshop Control Applications of Optimization	2-4 Sept. 1992	Munich Germany	31 March 1992	Prof. D. Kraft, FH München FB Maschinenbau & Fahrzeugtechnik Dachauerstr. 98b D-W-8000 München 2 Germany
IFAC Workshop Cost Effective Use of Computer Aided Technologies	7-8 Sept. 1992	Vienna Austria	31 May 1992	Prof. P. Kopacek Inst. f. Handling Dev. & Automation TU Vienna, Möllwaldpl. 5/4 A-1040 Vienna, Austria
IFAC/IFORS Workshop Man-Environment: The Challenging Relationship	9-11 Dec. 1992	Lisbon Portugal	May 92	Prof. R. Campos Guimaraes APDIO-CESUR-IST Av. Rovisco Pais P-1000 Lisbon, Portugal

- deadline past

Papers From the Next Issue – May 1992

Papers

Adaptive Control of the Radial Servo System
of a Compact Disc Player
(S. Draijer, M. Steinbuch, O.H. Bosgra)
An Expert System for Multivariable Controller
Design
(C.D. Tebbutt)
A Knowledge Environment for an Interactive
Control System Design Package
(G.K.H. Pang)
Necessary and Sufficient Conditions for a
Nonminimum Phase Plant to Have a
Recoverable Target Loop - A Stable
Compensator Design for LTR
(B.M. Chen, A. Saberi, P. Sannuti)
H∞/LTR Procedure with Specified Degree of
Recovery
(M. Saeki)
Pole Zero Cancellations and Closed Loop
Properties of an H∞ Mixed Sensitivity Design
Problem
(M.C. Tsai, E.J.M. Geddes, I. Postlethwaite)
Harmonic Balance Methods for the Analysis of
Chaotic Dynamics in Nonlinear Systems
(R. Genesio, A. Tesi)
Aiming Control: Residence Probability and
(D,T)-Stability
(S. Kim, S.M. Meerkov, T. Runolfsson)
Aggregation and Multi-Level Control in Discrete
Event Dynamic Systems
(C.M. Özveren, A.S. Willsky)

Brief Papers

Exponentially Stable Trajectory Following of
Robotic Manipulators Under a Class of Adaptive
Controls
(Z. Qu, D.M. Dawson, J.F. Dorsey)
A Method for Closed Loop Automatic Tuning of
PID Controllers
(T.S. Schei)
Adaptive Predictive Control with Mean-Square
Input Constraint
(E. Mosca, J.M. Lemos, T.F. Mendonca, P.
Nistri)
A Design of Discrete-Time Integral Controllers
with Computation Delays via Loop Transfer
Recovery
(T. Ishihara, H.-J. Guo, H. Takeda)
Eigenstructure Assignment for State
Constrained Linear Continuous Time Systems
(E.B. Castelan, J.-C. Hennet)
Measurement of the Parameters of All-Pole
Transfer Functions Using Shifted Hermite
Modulating Functions
(S.A. Jalali, J.R. Jordan, R.D.L. Mackie)
Convergence Rate for an Approximation
Approach to H∞-norm Optimization Problems
with an Application to Controller Order
Reduction
(Y. Liu, K.L. Teo)
On Stabilization of Nonlinear Systems with
Enlarged Domain of Attraction
(K. Ichikawa, R. Ortega)
The Singular H2 Control Problem
(A.A. Stoorvogel)
Descriptor Representations without Direct
Feedthrough Term
(M. Kuijper)
Solution to Matrix Equation AV+BW=EVF and

Eigenstructure Assignment for Descriptor
Systems
(G.R. Duan)
Invertibility and Inversion of Linear Periodic
Systems
(A.M. Perdon, G. Conte, S. Longhi)

Book Reviews

Singular Control Systems by L. Dai
(P. Zagalak)
Control and Dynamic Systems, Vol 29,
Advances in Algorithms and Computational
Methods in Dynamic Systems Control,
by C.T. Leondes (Ed.)
(F. Dumortier)
Programable Logic Controllers - Architecture
and Applications by G. Michel
(F. Ley)
Industrial Automation Circuit Design and
Components by D.W. Pessen
(K.H. Fasol)
Robot Dynamics and Control by M.W. Spong
and M. Vidyasagar
(P.C. Müller)

IFAC Congratulates

The Faculty of Mechanical Engineering of the
Ruhr-University Bochum awarded
Prof.Dr.Ing.Dr.sc.h.c Manfred Thoma the
degree of a Dr.Ing. h.c. in recognition of his
excellent achievements in promoting control
and automation technology as well as his
exemplary commitment to the International
Federation of Automatic Control, of which he
was President from 1984-87 and of which he is
now an Advisor.

WHO IS WHO IN IFAC
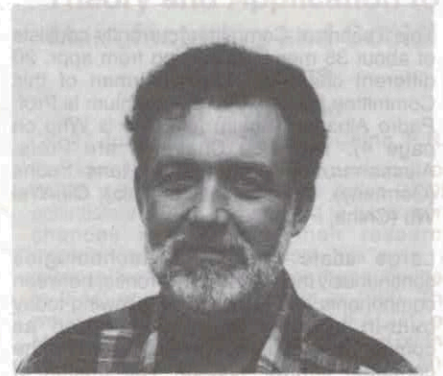
Prof. Pedro Albertos, C&I Chairman

Professor Pedro Albertos was born in Valencia,
Spain in 1943. His present position is as Pro-
fessor of Automatic Control (1977) and Head
of the Department of Systems Engineering,
Computers and Control, Universidad
Politecnica, Valencia (1979) (UPV), Spain,
leading a teaching staff of 56 members
interested in areas such as Advanced and
Intelligent Control Systems, Robotics, Real
Time Systems, Intelligent Instrumentation,
CADCS, Distributed Control Systems, Artificial
Vision and Parallel Architectures. He started
as Assistant Professor (1969-72) and Profes-
sor at the Universidad Politecnica Madrid, 1972-
75, becoming Full Professor at the Basque
Country University, Bilbao (1975-77).

Director of the Computing Centre, 1978-86
and Director of the Computing Services (1986-
87) (UPV) he has been involved in computer
services activities such as specification,
implementation and exploitation of one of the
pioneer Spanish university mainframes,
UNIVAC 1100, and administrative LAN,
3-com.

Invited by Profs.W. Perkins and P. Kokotovic,
he spent one term as visiting Professor at
Urbana Champaign University of Illinois, giving
a graduate course on digital control (1987).
Prof. Gomide invited him to teach a summer
course on Intelligent Control at Campinas
University of Brazil (1991). Currently, Prof.
Albertos is on leave at the Centre for Industrial
Control Science, University of Newcastle,
Australia, to research with Prof. G. Goodwin
on Digital Control Systems.

Chairman of a number of Technical
Committees, Technical Sessions, Round
Tables and so on, he is reviewer of some
technical journals and has been proposed as
Managing Editor in the IFIA/APFIA internatio-
nal series on Advanced Lectures in Intelligent
Automation.

His main fields of interest are Digital Control,
System Parameter Estimation, Adaptive
Control and Intelligent Control and Controllers.
Some results have been published in journals
such as Automatica, IEEE Trans in PAS,
RAIRO, Automatisme and presented in inter-
national technical meetings.

He participates in the European research
projects, ESPRIT and BRITE, and the
educational projects ERASMUS and TEMPUS.

Member of the Technical Board for the
Improvement and Control of Education Quality
(UPV) (1989-91), he has devoted many efforts
to teach and to organize the teaching of control
engineering.

As Chairman of the IFAC TC on Components
and Instruments, he has promoted two series
of successful events, i.e. Low Cost Automation
and Intelligent Components and Instruments,
both included in the Master Plan of IFAC
events.

Prof. Albertos is Senior Member of the IEEE.
He is fluent in French and English, likes almost
any kind of music, plays the guitar, but also
goes in for sports such as tennis and swimming.