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International Federation of Automatic Control

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Newsletter

Contents:

Emerging Technologies that will Change the World

In its February Issue MIT Technology Review presents ten researchers whose research in the area of new technologies will change the entire living and working world of people. Among the top ten we also find Professor Rolf Isermann from the Technical University of Darmstadt, former Vice-President and now Advisor and Council member of IFAC. Below find the article taken from "Technology Review".

Mechatronics

To improve everything from fuel economy to performance, automotive researchers are turning to "mechatronics," the integration of familiar mechanical systems with new electronic components and intelligent-software control. Take brakes. In the next five to 10 years, electromechanical actuators will replace hydraulic cylinders; wires will replace brake fluid lines; and software will mediate between the driver's foot and the action that slows the car. And because lives will depend on such mechatronic systems, Rolf Isermann, an engineer at Darmstadt University of Technology in Darmstadt, Germany, is using software that can identify and correct for flaws in real time to make sure the technology functions impeccably. "There is a German word for it: *gründlich,*" he says. "It means you do it *really* right."

In order to do mechatronic braking right, Isermann's group is developing software that tracks data from three sensors: one detects the flow of electrical current to the brake actuator; a second tracks the actuator's position; and the third measures its clamping force. Isermann's software analyzes those numbers to detect faults – such as an increase in friction – and flashes a dashboard warning light, so the driver can get the car serviced before the fault leads to failure.

"Everybody initially was worried about the safety of electronic devices. I think people are now becoming aware they are safer than mechanical ones," says Karl Hedrick, a mechanical engineer at the University of California, Berkeley. "A large part of the reason they are safer is you can build in fault diagnoses and fault tolerance. Isermann is certainly in the forefront of people developing technology to do this."

Isermann is also working to make engines run cleaner. He is developing software that detects combustion misfires, which can damage catalytic converters and add to pollution. Because it's not practical to have a sensor inside a combustion chamber, Isermann's system relies on data from sensors that measure oxygen levels in exhaust and track the speed of the crankshaft (the mechanism that delivers the engine's force to the wheels). Tiny fluctuations in crankshaft speed accompanied by changes in emissions reveal misfires. If a misfire is detected, the software can warn the driver or, in the future, might automatically fix the problem.

Partnerships with manufacturing companies – including Daimler Chrysler and Continental Teves – merge the basic research from Isermann's group with industry's development of such technologies in actual cars. Isermann says that "80 to 90 percent of the innovations in the development of engines and cars these days are due to electronics and mechatronics." Until recent years, mechatronic systems were found mainly in such big-ticket items as aircraft and industrial equipment or in small precision components for products such as cameras and photocopiers. But new applications in cars and trucks have helped prompt a surge in the number of groups working on mechatronics. The trend has been fueled by falling prices for microprocessors and sensors, more stringent vehicle-emissions regulations in Europe and California, and automakers' wanting to enhance their vehicles with additional comfort and performance features.

Although the luxury market looms largest today – new high-end models from BMW contain more than 70 microprocessors that control more than 120 tiny motors – mechatronics will be moving into the wider car market within five years, says Lino Guzzella, codirector of the Institute of Measurement and Control at the Swiss Federal Institute of Technology. And with software like Isermann's on board, the electronic guts of these new driving machines should be as sturdy and reliable as steel.

– David Talbot

Others in MECHATRONICS

RESEARCHERS AND THEIR PROJECTS

Lino Guzzella (IFAC Treasurer)
Swiss Federal Institute of Technology
Engine modeling and control systems

Karl Hedrick and Masayoshi Tomizuka
U. California, Berkeley
Control systems and theory

Uwe Kiencke (IFAC Technical Board Member)
U. Karlsruhe
Digital signal processing

Philip Koopman
Carnegie Mellon U.
Fault tolerance in control software

Lars Nielsen (IFAC Technical Committee Chair)
Linköping U.
Engine control systems

Farewell at the IFAC World Congress in Barcelona

At the Closing Ceremony of the Barcelona Congress, the Congress participants gave a "huge" and warm "Thank You" to the Congress Chair Prof. Ferraté who had been instrumental in bringing the IFAC World Congress to Spain.

Mechatronic Systems
2nd IFAC Conference
Berkeley, CA, USA, December 9 – 11, 2002

The 2nd IFAC Conference on Mechatronic Systems was held from December 9 – 11, 2002 at the University of California, Berkeley. Industrial products are increasingly sophisticated and complex. Market demands and societal needs have necessitated that industry respond with high-quality products in a timely manner. Mechatronics is recognized as the key element in such responses. This conference brought together more than 170 experts from 26 countries to share the state-of-the-art of mechatronics and to present new research results and perspectives regarding the future development in the multidisciplinary field of mechatronic systems.

In the first plenary talk, "Automotive Mechatronics," Dr. P. Schöner presented the motivation, technical challenges and future of mechatronics along with representative mechatronic solutions in the automotive industry. Professor H. Asada gave the second plenary talk, "Wet Mechatronics." He presented a new direction of mechatronics in wet environments such as thermo-fluid and bio-chemical environments. The third plenary talk by Professor S. Sastry, "Millirobotics for Minimally Invasive Telesurgery," was on the mechatronic developments in an important area of biomedical systems. These plenary talks were collectively an excellent summary of how mechatronic approaches have been and will continue to play key roles at the forefront of modern technologies. Mechatronic approaches pursue the synergy achieved through the integration of mechanical, electrical, and information technologies in the design, manufacture and operation of industrial products and processes. Synergies may be in terms of performance, physical dimension, cost, power efficiency, time for development, dealing with complexity, and so on. In addition to the three plenary talks, 146 technical papers were presented in 28 technical sessions. They covered a wide range of topics relevant to mechatronics: actuators/sensors, micro-electromechanical systems (MEMS), mechatronic devices/machines, control of mechatronic systems, human-machine interface/haptics, embedding computing and software engineering and design/integration methodologies for mechatronic systems. Technical sessions were also organized on

specific engineering systems to report on mechatronic approaches and solutions: automotive systems, biomedical systems, robots, hard disk drives, and motion/vibration control systems. Post conference tours were organized for visiting research laboratories at the University of California, Berkeley and Stanford University.

The main social activity was the banquet at the Chabot Space and Science Center. The museum was rented exclusively for the conference participants, and a special planetarium show and viewing of the moon surface and Saturn (with rings!) accompanied fine foods and wine.

The IFAC Technical Committee on Mechatronic Systems (MIS) sponsored this conference. The Committee was established recently in response to the ever growing importance of mechatronics. Mechatronics is not new to the IFAC community and it has naturally been a part of activities covered by other technical committees such as Automotive Control (TVS), Robotics (MIR) and Component and Instrumentation (MIC). MIS and this biennial Conference on Mechatronic Systems provide a cross-cutting forum to various application fields and industrial segments. Mechatronics is growing in other technical communities such as general electrical engineering and mechanical engineering. MIS and this conference serve as interfaces and coordinate activities with other technical societies where mechatronics-in-action is taking place. For example, IFAC and IEEE/ASME (Institute of Electrical and Electronics Engineering/American Society of Mechanical Engineering) coordinate their conference activities so that the IFAC Conference on Mechatronic Systems takes place every even year and the IEEE/ASME International Conference on Advanced Intelligent Mechatronics every odd year.

In general, sessions were well attended, and there were only a few no shows. Although we did not conduct a formal evaluation, comments we received from participants were all positive. The conference was a success!

Masayoshi Tomizuka
Chairman of International Program Committee

Programmable Devices and Systems – PDS 2003
IFAC Workshop
Ostrava, Czech Republic
February 11th – 13th, 2003

The IFAC Workshop on Programmable Devices and Systems – PDS 2003, organised by the Department of Measurement and Control, Technical University of Ostrava, Czech Republic in co-operation with the Institute of Electronics, Silesian University of Technology, Gliwice, Poland was held in Ostrava, Czech Republic in February 11 – 13, 2003. The Workshop is a continuation of the PDS conferences, which were held in Ostrava and in Gliwice in 1995 – 2001.

On the basis of its organisers' experiences and participants' opinions it has been decided to continue the scope for the PDS 2003 IFAC Workshop. The organisers believe that in the area of programmable devices and systems there are some problems sufficiently specific to them to justify the decision to organise the PDS 2003 IFAC Workshop.

The main objective is to provide a forum to present the latest research results and experiences in the area of the design and application of programmable devices and systems. PDS is a forum to discuss the current status and future trends of this particular branch of the programmable devices in measurement, control, and computer science.

The topics of the workshop were

i) Industrial Programmable Controllers & PLC's

ii) Embedded systems, Microprocessor and Micro-controllers

iii) Field Programmable Logic (PLD, CPLD, FPGA) and High End Design Means

iv) Signal Processing, and

v) Reliability and Safety of Circuits and Systems.

The IFAC Technical Committees on Components and Instruments and Safety of Computer Control Systems sponsored the Workshop.

During the three days of the PDS 2003 Workshop, 87 papers presented both theoretical and practice-oriented viewpoints from 13 countries. All papers accepted for presentation appeared in the Preprints of the meeting which were distributed to participants. Presented papers will be printed in Proceedings by Elsevier Science Ltd., Oxford, U.K.

Selected papers are offered for possible publication in the IFAC Journals Automatica, Control Engineering Practice and Affiliated Journals. Copyright of materials at an IFAC meeting is held by IFAC.

The technical programme of the Workshop included technical visits to enterprises ON SEMICONDUCTOR – TESLA SEZAM and SIEMENS Automotive in Frenštát pod Radhoštim.

Karel Vlcek, IPC Vice-Chair,
VŠB Technical University of Ostrava, CZ.

Vilém Srovnal, NOC Chair,
VŠB Technical University of Ostrava, CZ.

Papers from the November 2002 Issue

Recursive Partial Least Squares Algorithms for Monitoring Complex Industrial Processes
(X. Wang, U. Kruger, B. Lennox)
Wait-free Data Sharing between Periodic Tasks in Multiprocessor Control Systems
(O. Song, C.-H. Choi)
A Practical Multiple Model Adaptive Strategy for Multivariable Model Predictive Control
(D. Dougherty, D. Cooper)
Optimal Operation of Fed-batch Fermentations via Adaptive Control of Overflow Metabolite
(S. Valentinotti, B. Srinivasan, U. Holmberg, D. Bonvin, C. Cannizzaro, M. Rhiel, U. von Stockar)
Initial Condition-adaptive Robust Control for a High-speed Magnetic Actuator
(T. Kawabe)
RD-CNN for Driving a 2-D Conveyor Belt via Memory Shape Alloys
(M. Branciforte, R. Caponetto, L. Fortuna)
Design Issues and Implementation of Internet-based Process Control Systems
(S.H. Yang, X. Chen, J.L. Alty)
Kinematic Aspects of a Robot-positioner System in an Arc Welding Application
(A.P. Pashkevich, A.B. Dolgui, K.I. Semkin)
A Fuzzy Controller for an Electro-hydraulic Fin Actuator Using Phase Plane Method
(S.Y. Lee, H.S. Cho)

Informal Meeting of IFAC Officers
Laxenburg, Austria
21 – 22 March, 2003

As has been a tradition for more than 20 years, the IFAC President, Vice-Presidents, Past President, President-Elect and the IFAC Treasurer came together in Laxenburg at the Seat of the IFAC Secretariat to meet with the Secretary and the Secretariat staff. These meetings are used to informally discuss administrative matters and to strengthen the traditionally good links to the Austrian Academy of Sciences and the Austrian Ministry of Science and Innovation. They were introduced during the Presidency of Professor Sawaragi during his term of office from 1978 - 81. In this context it is also noteworthy that the IFAC Secretariat has been located in Laxenburg for 25 years now, most of the time with the same staff, which has lent additional stability and continuity to the activities of a Federation which elects its officials every three years.

Papers from the January 2003 Issue

Papers

On Linear Models for Nonlinear Systems
(P.M. Mäkilä, J.R. Partington)
Lyapunov-Krasovskii Approach to the Robust Stability Analysis of Time-delay Systems
(V.L. Kharitonov, A.P. Zhabko)
Stability Issues for Dynamic Traffic Assignment
(S. Peeta. T.-H. Yang)
Run-to-run Control Methods Based on the DHOBE Algorithm
(C. Zhang, H. Deng, J.S. Baras)

Brief Papers

Numerical Treatment of Multiobjective Optimal Control Problems
(M.M. El-Kady, M.S. Salim, A.M. El-Sagher)
Risk-sensitive Filtering, Prediction and Smoothing for Discrete-time Singular Systems
(H. Zhang, L. Xie and Y.C. Soh)
Robot Control and Parameter Estimation with Only Joint Position Measurements
(M.A. Arteaga)
Damping of Harmonic Disturbances in Sampled-data Systems – Parametrization of All Optimal Controllers
(H.T. Tolvonen, A. Medvedev)
Adaptive Nonlinear Excitation Control with L_2 Disturbance Attenuation for Power Systems
(T. Shen, S. Mei, Q. Lu, W. Hu, K. Tamura)
Reduced-order Control for a Class of Nonlinear Similar Interconnected Systems with Mismatched Uncertainty
(X.-G. Yan, L. Xie)
Filtering on Nonlinear Time-delay Stochastic Systems
(Z. Wang, D.W.C. Ho)
An Energy-shaping Approach to the Design of Excitation Control of Synchronous Generators
(M. Galaz, R. Ortega, A.S. Bazanella, A.M. Stankovic)
Fast Calculation of Stabilizing PID Controllers
(M.T. Söylemaz, N. Munro, H. Baki)
Wiener Models of Direction-dependent Dynamic Systems
(H.A. Barker, A.H. Tan, K.R. Godfrey)
Integral Control by Variable Sampling Based on Steady-state Data
(N. Özdemir, S. Townley)
Universal Stabilization of Feedforward Nonlinear Systems
(Y. Xudong)
Relay Auto-tuning of PID Controllers Using Iterative Feedback Tuning
(W.K. Ho, Y. Hong, A. Hansson, H. Hjalmarsson, J.W. Deng)
On the Synthesis of Controllers for Continuous Time LTI Systems that Achieve a Non-negative Impulse Response
(S. Darbha)
On the Stability of Nonautonomous Systems
(A. Iggidir, G. Sallet)

Technical Communique

Optimal Control of the Thrustel Skate
(K.M. Lynch)

Book Review

Nonlinear Identification and Control – A Neural Network Approach, by G.P. Liu
(S.S. Ge)

Papers from the February 2003 Issue

Papers

Optimal Output-transitions for Linear Systems
(H. Perez, S. Devasia)
Designing Robustly Stabilising Controllers for LTI Spatially Distributed Systems Using Coprime Factor Synthesis
(J. Reinschke, M.C. Smith)
A Clustering Technique for the Identification of Piecewise Affine Systems
(G. Ferrari-Trecate, M. Muselli, D. Liberati, M. Morari)
Control of Combustion Oscillators via H-infinite Loop-shaping μ-analysis and Integral Quadratic Constraints
(Y.-C. Chu, K. Glover, A.P. Dowling)

Brief Papers

On the Problem of General Structural Assignments of Linear Systems Through Sensor/Actuator Selection
(X. Liu, B.M. Chen, Z. Lin)
On-line Order Estimation and Parameter Identification for Linear Stochastic Feedback Control Systems (CARMA Model)
On Delay-dependent Stability for Linear Neutral Systems
(D. Ivanescu, S.-I. Niculescu, L. Dugard, J.-M. Dion, E.I. Verriest)
Hysteresis-based Switching Algorithms for Supervisory Control of Uncertain Systems
(J.P. Hespanha, D. Liberzon, A.S. Morse)
Sliding Mode Control for Two-time Scale Systems: Stability Issues
(M. Innocenti, L. Greco, L. Pollini)
Optimal Errors-in-variables Filtering
(R. Guidorzi, R. Diversi, U. Soverini)
Nonlinear Control of a 3-pole Active Magnetic Bearing System
(C.-T. Hsu, S.-L. Chen)
Frequency Domain Control-relevant Identification of MIMO AMB Rigid Rotor
(H.-J. Ahn, S.-W. Lee, S,-H. Lee, D.-C. Han)
Relay-based Closed Loop Transfer Function Frequency Points Estimation
(G.H.M. de Arruda, P.R. Barros)
Pseudo Decentralized Switching Control
(A.G. Aghdam, E.J. Davison)
Controller Tuning Freedom Under Plant Identification Uncertainty: Double Youla Beats Gap in Robust Stability
(S.G. Douma, P.M.J. van den Hof, O.H. Bosgra)
Coordinated Passivation Designs
(M. Larsen, M. Jankovic, P.V. Kokotovic)
Discontinuous Exponential Stabilization of Chained Form Systems
(N. Marchand, M. Alamir)
Strict Lyapunov Functions for Time-varying Systems
(F. Mazenc)

Technical Communiques

An Equivalence Result in Linear-quadratic Theory
(W.A. van den Broek, J.C. Engwerda, J.M. Schumacher)
H-infinite Control of Dead-time Systems Based on a Transformation
(Q.-C. Zhong)

Book Reviews

Positive Linear Systems: Theory and Applications, by L. Farina and S. Rinaldi
(Y. Ohta)
Qualitative Theory of Hybrid Dynamical Systems, by A.S. Matveev and A.V. Savkin
(D. Liberzon)
Optimal Control of Singularly Perturbed Linear Systems and Applications, by Z. Gajic and M.-T. Lim
(J.M. Berg)
Self-learning Control of Finite Markov Chains, by A.S. Poznyak, K. Najim and E. Gomez-Ramirez
(B. Van Roy)

Papers from the March 2003 Issue

Papers

Optimal Stochastic Fault Detection Filter
(R.H. Chen, D.L. Mingori, J.L. Speyer)
The Full Information and State Feedback H2 Optimal Controllers for Descriptor Systems
(J.Y. Ishihara, M.H. Terra, R.M. Sales)
Model Validation for Control and Controller Validation in a Prediction Error Identifications Framework – Part I: Theory
(M. Gevers, X. Bombois, B. Codrons, G. Scorletti, B.D.O. Anderson)
Model Validation for Control and Controller Validation in a Prediction Error Identifications Framework – Part II: Illustrations
(M. Gevers, X. Bombois, B. Codrons, G. Scorletti, B.D.O. Anderson)
Linear Control of Live Marked Graphs
(Ph. Darandeau, X. Xie)
Asymptotic Controllability and Observability Imply Semiglobal Practical Asymptotic Stabilizability by Sampled-data Output Feedback
(H. Shim, A.R. Teel)
Low-gain Integral Control of Continuous-time Linear Systems Subject to Input and Output Nonlinearities
(T. Fliegner, H. Logemann, E.P. Ryan)

Brief Papers

Control of Discrete-time Nonlinear Systems with a Time-varying Structure
(R. Ordonez, K.M. Passino)
Global Stabilization and Disturbance Suppression of a Class of Nonlinear Systems with Uncertain Internal Model
(Z. Ding)
Friction Compensation for a Sandwich Dynamic System
(A.Taware, G. Tao, N. Pradhan, C. Teolis)
An Algorithm for Multi Parametric Quadratic Programming and Explicit MPC Solutions
(P. Tondel, T.A. Johansen, A. Bemporad)
Frequency Domain Solution to Delay-type Nehari Problem
(Q.-C. Zhong)
Robust H_1 Filtering for Uncertain Impulsive Stochastic Systems Under Sampled Measurements
(S. Xu, T. Chen)
Observer-based Stabilization of Switching Linear Systems
(Z.G. Li, C.Y. Wen, Y.C. Soh)
Robust Pole Clustering in a Good Ride Quality Region of Aircraft for Matrices with Structured Uncertainties
(S.-G. Wang)
Multiple-objective Risk Sensitive Control and its Small Noise Limit
(A.E.B. Lim, X.Y. Zhou, J.B. Moore)
An LMI Approach to Design Robust Fault Detection Filter for Uncertain LTI Systems
(M. Zhong, S.X. Ding, J. Lam, H. Wang)

Techical Communiques

Robust Adaptive Control for Nonlinear Uncertain Systems
(W.M. Haddad, T. Hayakawa, V. Chellboina)
Arbitrary Fuel-optimal Attitude Maneuvering of a Non-symmetric Space Vehicle in a Vehicle-fixed Coordinate Frame
(I. Ioslovich)

Book Reviews

Electric Systems, Dynamics and Stability with Artificial Intelligence Applications, by J.A. Momoh and M.E. El-Hawary
(O.P. Malik)
Nonlinear System Identification, by O. Nelles
(E. Walter)

Papers from the April 2003 Issue

Papers

MPC for Stable Linear Systems with Model Uncertainty
(M.A. Rodrigues, D. Odloak)
Exponential Stabilizability of Finite-dimensional Linear Systems with Limited Data Rates
(G.N. Nair, R.J. Evans)
Stability and Operating Constraints of Adaptive LMS-based Feedback Control
(M.A. Vaudrey, W.T. Baumann, W.R. Saunders)
Missile Guidance Laws Based on Pursuit-evasion Game Formulation
(V. Turetsky, J. Shinar)
Parameter Identifiability of Nonlinear Systems: The Role of Initial Conditions
(M.P. Saccomani, S. Audoly, L. D'Angio)

Brief Papers

Optimal Control of Nonlinear Systems: A Predictive Control Approach
(W.-H. Chen, D.J. Balance, P.J. Gawthrop)
Circle and Popov Criteria as Tools for Nonlinear Feedback Design
(M. Arcak, M. Larsen, P. Kokotovic)
Adaptive Control of Linear Time-varying Systems
(R. Marino, P. Tomei)
Optimal Spectral Resolution in System Identification
(V. Arkov, G. Kulikov, T. Breikin)
Regularization Networks for Inverse Problems: A State-space Approach
(G. de Nicolao, G. Ferrari-Trecate)
Tracking Trajectories of the Cart-pendulum System
(F. Mazenc, S. Bowong)
Structural Properties and Poles Assignability of LTI Singular Systems und Output Feedback
(R. Yu, D. Wang)
H_2 Performance of Preview Control Systems
(A. Kojima, S. Ishijma)
Residual Generator Design for Singular Bilinear Systems Subjected to Unmeasurable Disturbances: An LMI Approach
(M. Zsadzinski, E. Magarotto, H. Rafaralahy, H. S. Ali)
Analysis and Design of Parabolic PDE Systems with Input Constraints
(N.H. El-Farra, A. Armaou, P.D. Christofides)
A VSS Identification Scheme for Time-varying Parameters
(J.-X. Xu, Y.-J. Pan, T.-H. Lee)
Robust Nonlinear Disturbance Suppression of a Magnetic Levitation System
(L. Gentili, L. Marconi)
Networked Control Design for Linear Systems
(P.V. Zhivoglyadov, R.H. Middleton)

Technical Communique

On Stabilization of Min-max Systems
(Q. Zhao, D.-Z. Zheng)

Book Reviews

Robot Force Control, by Bruno Siciliano and Luigi Villani
(M. Egerstedt)
Structure and Synthesis of PID Controllers, by Aniruddha Datta, Ming-Tzu Ho and Shankar P. Bhattacharyya
(Q.-G. Wang)
Robust and H-infinite Control, by Ben M. Chen
(P. Colaneri)
Actuator Saturation Control, by V. Kapila and K.M. Grigoriadis
(F. Blanchini, S. Miani)

WHO IS WHO IN IFAC

J.C. Geromel – IFAC Council Member

José C. Geromel was born in Itatiba, SP, Brazil in 1952. He received the B.Sc. and M.Sc. degrees in Electrical Engineering from the University of Campinas (UNICAMP-Brazil) in 1975 and 1976 respectively and the Docteur d'État ès Sciences Physiques degree from the University Paul Sabatier, France in 1979. In 1975 he joined the School of Electrical and Computer Engineering at UNICAMP where he is presently professor of Control Theory. In 1987 he held a visiting professor position at Milan Polytechnique Institute, Milan, Italy.

Prof. Geromel is a member of the Editorial Board of Studies in Informatics and Control and Subject Editor of International Journal of Robust and Nonlinear Control. In 1994 he was awarded the Zeferino Vaz Award for his teaching and researches activities at UNICAMP. Since 1991 he has beem a Fellow and in 1997 he was elected member of the Electrical Engineering Committee of the CNPq (Brazilian Council for Research Development). Since 1998 he has been the Dean for Graduate Studies at UNICAMP and member of the Brazilian Academy of Science. In 1999 he was named for Chevalier dans l' Ordre des Palmes Academiques by the Minister of National Education of France.

He has supervised twelve M.Sc. and eight Ph.D students. He has published more than 120 technical papers, 50 of them in international journals. He is co-author of the book Control Theory and Design (with P. Colaneri and A. Locatelli, Academic Press, 1997).

His current research interests include convex programming theory, robust control systems design, robust filtering and joint location and control systems design. At the General Assembly of IFAC in Barcelona 2002 he was elected member of the IFAC Council.

The IFAC

Information Brochure 2002

is now available and can be obtained from the IFAC Secretariat by mail or e-mail.

Title	2003	Place	Further Information
IFAC Workshop Real Time Programming	May 14 – 17	Lagow Poland	http://www.iie.uz.zgora.pl/wrtp03 e-mail: wrtp03@iie.uz.zgora.pl
American Control Conference – in co- operation with IFAC –	June 4 – 6	Denver CO, USA	http://acc2003.me.berkeley.edu/ e-mail: bequeb@rpi.edu
IFAC Symposium 5th Fault Detection, Supervision and Safety of Technical Processes – SAFEPROCESS	June 9 – 11	Washington DC, USA	http://safeproc.gmu.edu e-mail: jgertler@gmu.edu
IFAC Symposium Power Plants and Power Systems 2003	June 9 – 12	Seoul Korea	http://ifacpps2003.org e-mail: ifacpps2003@insession.co.kr
IFAC Symposium 6th Advances in Control Education – ACE 2003	June 16 – 18	Oulu Finland	http://ntsat.oulu.fi e-mail: office@atu.fi
IFAC Conference Analysis and Design of Hybrid Systems – ADHS03	June 16 – 18	St. Malo France	http://www.supelec-rennes.fr/adhs03/ e-mail: adhs03@supelec-rennes.fr
IFAC Symposium Advanced Control of Chemical Processes – ADCHEM 2003	June 18 – 20	Hong Kong China	http://www.ust.hk/adchem2003 http://www.adchem2003.uni-stuttgart.de/ e-mail: adchem2003@ist.uni-stuttgart.de
XVII IMEKO WORLD CONGRESS *Metrology in the 3rd Millennium*	June 22 – 27	Dubrovnik Croatia	http://www.imeko.org e-mail: imeko2003@hmd.hr
IFAC Symposium 4th Robust Control Design – ROCOND 2003	June 25 – 27	Milan Italy	http://www.elet.polimi.it/ROCOND2003 e-mail: colaneri@elet.polimi.it
IFAC Workshop Automatic Systems for Building the Infrastructure in Developing Countries (Knowledge and Technology Transfer)	June 27 – 28	Istanbul Turkey	http://www.dogus.edu.tr/decom03 e-mail: decom03ifac@dogus.edu.tr
IFAC Workshop 12th Control Applications of Optimization – CAO	June 30 – July 2	Visegrad Hungary	http://www.conferences.hu/CAO2003/ e-mail: bars@aut.bme.hu
IFAC Workshop Technology and International Stability	July 3 – 5	Waterford Rep. of Ireland	http://www.ihrt.tuwien.ac.at/swiis03 e-mail: swiis@ihrt.tuwien.ac.at
IFAC Conference Fieldbus Systems and their Applications – FeT2003	July 7 – 8	Aveiro Portugal	http://www.det.ua.pt/eventos/fet2003 e-mail: fet2003@det.ua.pt
IFAC Symposium Intelligent Components and Instruments for Control Applications – SICICA 2003	July 9 – 11	Aveiro Portugal	http://www.det.ua.pt/eventos/sicica2003 e-mail: sicica2003@det.ua.pt
IFAC Workshop Modelling and Analysis of Logic Controlled Dynamic Systems	July 30 August 1	Irkutsk Lake Baikal Russia	http://giscenter.icc.ru/ifacbaik/ e-mail: belyaeva@icc.ru
IFAC Symposium 10th Transportation Systems	Aug. 4 – 6	Tokyo Japan	http://www.is.aist.go.jp/ifac-cts2003 e-mail: tsugawa.s@aist.go.jp
IFAC Symposium 5th Modelling and Control in Biomedical Systems	August 21 – 23	Melbourne AUS	http://www.tourhosts.com.au/ifac2003 e-mail: ifac2003@tourhosts.com.au
IFAC Symposium 13th System Identification – SYSID 2003	August 27 – 29	Rotterdam NL	http://sysid2003.nl e-mail: info@sysid2003.nl
IFAC Symposium 7th Robot Control – SYROCO 2003	September 1 – 3	Wroclaw Poland	http://www.zpcir.ict.pwr.wroc.pl/syroco2003 e-mail: tchon@ict.pwr.wroc.pl
European Control Conference (in co-operation with IFAC)	September 1 – 4	Cambridge UK	http://conferences.iee.org/ECC03/ e-mail: jmm@eng.cam.ac.uk
IFAC Concerence Control Systems Design	September 7 – 10	Bratislava Slovakia	http://www.kasr.elf.stuba.sk/csd2003 e-mail: csd2003@kasr.elf.stuba.sk
IFAC Workshop Time Delay Systems	September 8 – 10	Rocquencourt France	http://www.inria.fr/tds03.html e-mail: tds03@inria.fr
IFAC Workshop 7th Algorithms and Architectures for Real-Time Control – AARTC 2003	September 8 – 10	Sheffield UK	http://www.shef.ac.uk/aartc-2003 e-mail: aartc–2003@sheffield.ac.uk
IFAC Conference 6th Manoeuvring and Control of Marine Systems – MCMC 2003	September 17 – 19	Girona Spain	http://iiia.udg.es/mcmc03 e-mail: mcmc03@iiia.udg.es

FORTHCOMING EVENTS (ctd.)

Title	2003	Place	Further Information
IFAC Symposium 8th Automated Systems Based on Human Skill – joint design of technology and organization	September 22 – 24	Gothenburg Sweden	http://www.davinci.chalmers.se/Ifac_2003 e-mail: johan.stahre@hfe.chalmers.se
EWICS/IFAC/IFIP Intl. Conference Computer Safety, Reliability and Security – SAFECOMP 2003	September 23 – 26	Edinburgh UK	http://www.safecomp.org e-mail: info@safecomp.org
IFAC Workshop Intelligent Assembly and Disassembly	October 9 – 11	Bucharest Romania	http://www.iad2003.com e-mail: iad03@icar.pub.ro
IFAC Workshop New Technologies for Automation of the Metallurgical Industry	October 11 – 13	Shanghai China	http://www.baosight.com/ifac03 e-mail: wangwei@dlut.edu.cn

Title	2004	Place	Further Information
IFAC Symposium Computer Applications in Biotechnology	March 28 – 31	Nancy France	http://www.ensic.inpl-nancy.fr/CAB9/ e-mail: cab9@ensic.inpl-nancy.fr
IFAC Symposium 11th Information Control Problems in Manufacturing – INCOM 2004	April 5 – 7	Salvador Brazil	http://www.eletro.ufrgs.br/incom2004/ e-mail: cpereira@eletro.ufrgs.br
IFAC Symposium Advances in Automotive Control	April 19 – 23	Salerno Italy	http://www.ifac04.unisa.it e-mail: ifac04@unisa.it
IFAC Symposium Automatic Control in Aerospace	June 14 – 18	St. Petersburg Russia	http://aca2004.aanet.ru e-mail: aca2004@aanet.ru
IFAC Symposium Telematics Applications in Automation and Robotics – TA 2004	June 21 – 23	Helsinki Finland	http://www.automaatioseura.fi/TA04 e-mail: office@atu.fi
American Control Conference – in co-operation with IFAC –	June 30 – July 2	Boston MA, USA	http://www.mie.uiuc.edu/acc2004/index.asp e-mail: speyer@seas.ucla.edu
IFAC Symposium Intelligent Autonomous Vehicles – IAV 2004	July 5 – 7	Lisbon Portugal	http://iav04.isr.ist.utl.pt e-mail: iav04@isr.ist.utl.pt
IFAC Conference Control Applications in Marine Systems – CAMS 2004	July 7 – 9	Ancona Italy	http://cams04.unian.it e-mail: cams04@unian.it
IFAC Workshop Fractional Differentiation and its Applications – FDA '04	July 19 – 20	Bordeaux France	http://www.lap.u-bordeaux.fr/fda04/home.html e-mail: fda04@lap.u-bordeaux.fr
Asian Control Conference (5th) – in co-operation with IFAC –	July 20 – 23	Melbourne Australia	e-mail: l.brindle@ee.mu.oz.au
IFAC Symposium Large Scale Systems: Theory and Applications	July 26 – 28	Osaka Japan	http: not yet available e-mail: ikeda@mech.eng.osaka-u.ac.jp
IFAC Workshops on – Adaptation and Learning in Control and Signal Processing – ALCOSP – Periodic Control Systems – PSYCO	August 30 – September 1	Yokohoma Japan	http://www.contr.sd.keio.ac.jp/ifacws04/main.htm e-mail: katayama@amp.i.kyoto-u.ac.jp e-mail: sano@sd.keio.ac.jp
IFAC Symposium 6th Nonlinear Control Systems – NOLCOS'04	September 1 – 3	Stuttgart Germany	http://www.nolcos2004.uni-stuttgart.de e-mail: nolcos2004@ist.uni-stuttgart.de
IFAC Multitrack Conference Advanced Control Strategies for Social and Economic Systems	September 2 – 4	Vienna Austria	http://www.ihrt.tuwien.ac.at/acs04 e-mail: kopacek@ihrt.tuwien.ac.at
IFAC Symposium Mechatronic Systems	September 6 – 8	Sydney Australia	http://mechatronics2004.newcastle.edu.au/mech2004 e-mail: mechatronics2004@ee.newcastle.edu.au
IFAC Symposium 11th Automation in Mining, Mineral and Metal Processing – MMM 2004	September 8 – 10	Nancy France	http://www.cran.uhp-nancy.fr/ifac-mmm2004/ e-mail: mmm2004@cran.uhp-nancy.fr
IFAC Workshop 2nd Advanced Fuzzy/Neural Control	September 16 – 17	Oulu Finland	http://www.ntsat.oulu.fi/ e-mail: office@atu.fi
IFAC Workshop Discrete Event Systems	September 22 – 24	Reims France	http://www.univ-reims.fr/wodes04 e-mail: wodes04@univ-reims.fr
IFAC Symposium System Structure and Control	December 8 – 10	Oaxaca Mexico	http://sssc04.cinvestav.mx e-mail: jtorres@cinvestav.mx

Title	2005	Place	Further Information
American Control Conference – in co-operation with IFAC –	June 8 – 10	Portland, OR USA	http: not yet available e-mail: SJayasuriya@mengr.tamu.edu
16TH IFAC WORLD CONGRESS	**JULY 4 – 8**	**PRAGUE CZECH REPUBLIC**	**http://www.ifac.cz**