IFAC International Federation of Automatic Control
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1993
No. 1
Feb.

Newsletter

Contents:

12th IFAC World Congress
Sydney, Australia, 19-23 July, 1993

Congress Venue, Darling Harbour, Sydney

The Congress will be held in the Sydney Convention and Exhibition Centre at Darling Harbour, which is situated in the Centre of Sydney and right on Sydney Harbour. The Opening Ceremony will be held on the afternoon of Sunday, 18 July at 1430 hours in the world famour Sydney Opera House.

The technical program will span the whole 5 days of the Congress and will run in 12 parallel sessions. Each day will start with a Plenary address. Congress papers will be presented in a new and innovative structure. Embedded in the Congress will be a number of minisymposia, targeted areas and poster sessions, in addition to the more usual regular papers. Organizers hope that this structure will allow delegates maximum flexibility in their choice of papers to attend. Integrated with the technical program will be a high quality exhibition of control hardware and software. This will allow sponsors and selected exhibitors to show how the ideas of modern control can now be easily used for design and implementation.

A full range of technical visits and social programs has also been developed for delegates and accompanying persons. Post Congress Tours are also available to the 'Red Centre', Kakadu National Park and the Great Barrier Reef.

The Third Announcement and Advance Program is now available and has already been sent to all authors and other people who have expressed interest in the Congress. The early bird registration fee (30 April) is $A595 and after that date $A695. Should you be interested in participating in the Congress but have not yet received a program and the registration form please write to or fax

The Congress Manager
IFAC Congress
AE Conventions Pty Ltd
Engineering House
11 National Circuit
Barton ACT 2600
Australia
Fax: (Int) +61 6 273 2012
Tel: (Int) +61 6 270 6562

for an immediate reply.
Alternatively, you can send an email to K.Lim@UNSW.edu.au

The IFAC community, the IPC, the NOC and the NMO (The Institution of Engineers, Australia) invite you to come to Australia for what we expect to be an outstanding technical event and a once in a lifetime personal experience.

N.W. Rees
NOC Chairman

Control Engineering Practice

New IFAC Journal

First Issue February 1993

(Table of Contents cf page 5)

Editorial: Meeting the Needs of the Automation Industry

Some ten years ago, it was suggested that, as control theory was at least several decades ahead of practice, publishers should attempt to shift the balance of their publications in the automation field from highly theoretical to applied! As so often before, the good ideas were not put into practice and today it is still true that theory is galloping well ahead of the practical applications. The few exceptions fall within a few very advanced (often strategic) areas, normally characterized by a high level of expenditure, most of which is typically unaccountable to shareholders.

In IFAC circles too, accusations have continually circulated that the Federation is far too theoretically based and dominated by academics and researchers. Whilst the latter point might be largely true - a sad reflection possibly on the lack of foresight by industry to play an active role in the promotion of technology primarily being developed for its own use - a detailled search through the many papers presented at the 40-50 IFAC related events held annually, reveals a completely different picture. The bulk of IFAC events are well supported by industrialists and approximately 40-50 % of the papers presented are typically drawn from industry and, indeed, presented by industrialists.

The question which has been posed to IFAC for several years now has been simple: How to mine this rich seam of information of interest to industrialists but seemingly difficult to transfer from the relatively hallowed walls of the official Proceedings volumes, produced as the result of IFAC events, into the day-to-day lives of practising professional industrial engineers. The need to resolve this issue was not just one of self-interest to IFAC but, given the rapid changes which we are still undergoing in terms of technological development, one of crucial interest to the automation industry.

Few can doubt the conflicting information which reaches the practising professional. Underlying this, though, must be the conclusion arrived at by Peter Elzer in his presentation at the last IFAC World Congress in Tallinn. Professor Elzer, now an academic, but a person with vast industrial experience, had studied technological innovation and its introduction into practice. He came to the conclusion that since the introduction of technology as we know it, an on-going continuous 'twenty year cycle' has existed. In other words, from the first glimmers, and maybe a prototype of a new idea, it takes up to twenty years for the idea to firm up and become an industrial reality. Bearing this in mind does help to resolve, for example, why computer technology, as advanced as it appears at the moment, has still not invaded many aspects of automation as we might have predicted, and that relatively simple PLCs and single-loop controllers still dominate industrial practice. It also explains why important developments, such as the use of open systems in communications, epitomized possibly by the MAP and Fieldbus standardization exercises, do take so long to become accepted by the industry at which they are aimed.

Of course the overall picture from the industrial standpoint continues to be confusing and will be so for many decades to come. We have, on the one hand the constant emergence of new theoretical control techniques and algorithms, with a whole range of mathematical techniques available to solve any given problem. At the same time, though, we have the artificial intelligence pragmatists starting from the viewpoint that mathematics cannot solve many of our problems, and we must look for solutions from more heuristic or learning approaches. In terms of sheer hardware, too, we saw predictions five years ago which showed that we were quickly going to reach the end point in how far we could push very large-scale integrated circuitry. These predictions simply have not yet proved to be true, and the rate at which processors are emerging with increased power and complexity must still amaze anybody interested in technological development. In terms of communications as well, from kiloboard-based systems we have moved rapidly to standards based on 10 megabits per second and it now appears that the gigaband range is well and truly in sight. Costs of fibre-optically based systems continue to drop and even low-cost optical fibre fieldbus systems are being shown at exhibitions.

On the other hand, though, we still do not really see any light at the end of the software reliability/predictability tunnel and even some of the most recent surveys show that we have difficulty getting beyond the one error in 300 lines of code situation. Manufacturers of software are still not willing to provide us with any form of real guarantee that their products will work, and many state that if we use their products and something goes wrong it is our, the users' fault. Real-time issues, so long submerged in the shadows of theoretical research, are now rapidly being accepted by practitioners as the key to future system development. At last the realization has dawned that temporal predictability is as vital as logical predictability, and at last one of the world's leading computer vendors has acknowledged publicly that a large sector of their business lies in the real-time computing market.

With the goal of providing a platform for technical information transfer *Control Engineering Practice* was conceived. The objective is simple - to provide a platform on which the latest products and developments can be brought to the attention of the industrialist and the applications-oriented academic and researcher. *Control Engineering Practice* intends to publish only papers which are immediately readable and which have true value for the practitioner. Of course, at times, the boundaries between the laboratory and the shopfloor will be fuzzy, but the attempts always will be to ensure that there is some definite application in sight of any material that is presented. The papers themselves will deliberately be kept brief and to the point. They will be drawn from many sources, the prime one being that rich seam of golden applications-based papers presented at various IFAC events. In almost all cases these will require some redevelopment, but the objective is to provide a very rapid turnaround. The same rule will apply to directly submitted papers: Only those which are of interest to our applications-oriented community will be considered and our reviewers will not even be asked to look at papers whose home rests firmly in other publications, in particular in our sister, and very well-established and -respected journal *Automatica*. A unique feature of *Control Engineering Practice* will also be the publication of abstracts of all papers presented at all IFAC events. This will provide a unique means of rapidly accessing all the amazing material available through the IFAC channels.

Against this background, though, is always IFAC's hallmark - quality. The IFAC seal of approval has always meant that events sponsored by IFAC have the guarantee of being professionally organized and professionally run. The quality of papers presented, therefore, is always under the control of an international panel of experts. This principle continues in *Control Engineering Practice*, and although the organizers of events will be responsible for suggesting papers for consideration, an additional stage of review is being insisted upon, calling upon a panel of international editors drawn predominantly from industry.

The world stands at a very important crossroads in its development. The wonderful bringing of peace, and resolution of many international conflicts has been accompanied by economic devastation, the like of which we have never seen before. At the same time environmental and associated issues are becoming predominant. We are also rapidly realizing the importance of automation, not as a means of putting people out of work but as a means of complementing human activities. The realization that technology is universal, is now accepted throughout the globe, and we, as professional engineers, are now being called upon to act in a socially responsible fashion. There are many vitally important new challenges to take up, not just in developing new theories and new technologies but in attempting to make these work, not just to the benefit of an isolated community or country, but to the benefit of humanity. The blend between man and machine in which control and automation technology is the emulsifier, must be our goal if we are to justify our humanity. The goal of IFAC must be to promote this new technological revolution, and *Control Engineering Practice* is viewed as one of the prime tools to be used by IFAC in striving towards these goals.

M.G. Rodd, Editor-in-Chief, *Control Engineering Practice*
Institute for Industrial Information Technology Limited, Innovation Centre, Singleton Park, Swansea SA2 8PP, UK

IFAC Congratulates

The Institute of Electrical and Electronics Engineers (IEEE) recently announced that their highest award, the IEEE Medal of Honor, was presented to **Karl Johan Åström**. The Medal of Honor is presented 'for an exceptional contribution to the field of science and technology encompassed by the IEEE' and was awarded to Professor Åström for the 'development of underlying theory and applications of self-tuning regulators and related adaptive control techniques'.

It is a great honour for the entire automatic control community that one of 'our own' receives this very prestigious award. The Medal of Honor was established in 1917 and only one is given each year. The award includes a certificate, a gold medal and a cash prize.

The name of Åström now joins the illustrious list of previous winners. It is the electrical engineers' equivalent of the Nobel Prize and, indeed, several Medal of Honor winners have also won the Nobel Prize in physics or chemistry.

IFAC is greatly honoured by the IEEE's recognition of Karl's achievements and has benefits from his continuing role as a major contributor to our field and family.

Motion Control for Intelligent Automation
IFAC/IMACS/IEEE/IUTAM Workshop
Perugia, Italy, 27-29 October, 1992

Problems connected with the design and implementation of high quality devices for the control of mechanical motion are at present indicated by a new name: Motion Control. It can be considered as the utmost sophistication in the control of mechanical motion once high performance specifications should be attained or when very complicated devices should be controlled. Its target is to improve the accuracy and the dynamics, to minimize the size of the actuator, to increase the productivity, to reduce energy consumption. Many applications could be interesting to Motion Control although up to now the more relevant applications regarded the motion of high performance robots. The broadening of the applications will be connected with the wider knowledge of Motion Control topics.

Motion Control is presently coordinated inside the IFAC Technical Committee on Components and Instruments. The organization of this Workshop has been one of the activities of the Working Group on 'Electromechanical Components for Motion Control'. The above-mentioned Workshop, which is the first event on Motion Control promoted by IFAC, was co-sponsored by IMACS, the IEEE Industrial Electronics Society and IUTAM. Four other Workshops were organized by the IEEE Industrial Electronics Society, two in Japan and two in Europe.

Motion Control topics include all the problems related to the control of the mechanical systems in which the attainment of the performance specifications depends on the behavior of the drive. The design of the control strategies for the mechanical motion is particularly interesting because the influence of unmodelled dynamics and nonlinearities is as much relevant as the dynamics of the controlled system is increased. Adaptation techniques, robust controller, on-line parameters, state variables and disturbance estimation are fundamental in the attainment of a very rapid dynamic response.

In this Workshop, a set of twenty invited papers were included in five Plenary Sessions so as to focus the development of:

- mechanical systems modelling
- control strategies
- intelligent instrumentation
- dedicated microprocessor devices
- new fields of applications

Many other applications were offered and included in nine Technical Sessions and in three Poster Sessions. One of these was dedicated to the presentation of Industrial Components for Motion Control.

More than 100 persons attended the Workshop, which took place in the new buildings of the Engineering Faculty of the University of Perugia. The Regional Council of Perugia invited the participants to the Honour Hall and following a short illustration of the trend of the regional industries, offered a welcome cocktail.

A de Carli, IPC Chairman

Offenlegung:

Das Medienwerk „IFAC Newsletter" wird als Organ der „International Federation of Automatic Control (IFAC)" verlegt und ist Eigentum dieser Internationalen Föderation, deren Tätigkeit der Förderung von Wissenschaft und Technik automatischer Regelung und Steuerung dient. Die Föderation hat ihren Sitz in Zürich und ist nach Schweizer Recht als gemeinnütziger Verein angemeldet. Sie verfolgt weder wirtschaftliche noch praktische Ziele.
Das Sekretariat der IFAC befindet sich seit 1978 aufgrund eines Übereinkommens mit der Österreichischen Bundesregierung und der Österreichischen Akademie der Wissenschaften in Laxenburg.
Der „IFAC Newsletter" erscheint sechsmal jährlich in englischer Sprache unter der Redaktion des Generalsekretärs der IFAC, Dipl.Ing. Dr. Gusztáv Hencsey. Die Zeitschrift dient der Information über die Aktivitäten der IFAC. Sie wird kostenlos an Abonnenten in 48 Ländern versandt, die Kosten werden von der IFAC aus Beiträgen der derzeit 44 Mitgliedsländer getragen. Präsident der IFAC ist für 1990/93 Professor Brian D.O. Anderson, (Australien), Vizepräsidenten sind Prof. Dr. L. Ljung (Schweden) und Prof.Dr. Y.Z. Lu (China). Alle Funktionen werden ehrenamtlich ausgeübt.

(To our readers: To comply with the Austrian 'Media Act' every publication must contain a declaration once a year concerning ownership and purpose as above.)

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Preview

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The Journal of IFAC the International Federation of Automatic Control

Papers From the Next Issue – March 1993

Tutorial Paper

Robust Control and H∞Optimization
(H. Kwakernaak)

Papers

Application of EKF Technique to Ship Resistance Measurement
(G. Liu)
Grey-Box Modelling and Identification, Using Physical Knowledge and Bayesian Techniques
(H.J.A.F. Tulleken)
An Integrated Collision Prediction and Avoidance Scheme for Mobile Robots in Non-Stationary Environments
(K.J. Kyriakopoulos, G.N. Saridis)
Adaptive Control of Systems with Backlash
(G. Tao, P.V. Kokotovic)
Performance Limitations of Non-Minimum Phase Systems in the Servomechanism Problem
(L. Qiu, E.J. Davison)
Discrete-Time Loop Transfer Recovery for Systems with Non-Minimum Phase Zeros and Time Delays
(Z. Zhang, J.S. Freudenberg)
Direct Control Design in Sampled-Data Uncertain Systems
(O. Yaniv, Y. Chait)
The Generalized H^2 Control Problem
(M.A. Rotea)
New Results on Composite Control of Singularly Perturbed Uncertain Linear Systems
(M. Corless, F. Garofalo, L. Glielmo)
H∞ Optimal Control for Singularly Perturbed Systems Part I: Perfect State Measurements
(Z. Pan, T. Basar)

Brief Papers

Adaptive Cross-Direction Control of Paper Basis Weight
(A. Halousková, M. Kárny, I. Nagy)
Extended Discrete-Time LTR Synthesis of Delayed Control Systems
(J.H. Shen, A. Ray)
Heuristically Enhanced Feedback Control of Constrained Systems: The Minimum Time Case
(M. Sznaier, M.J. Damborg)
Utility of Imaging Sensors in Tracking Systems
(D.D. Sworder, R.G. Hutchins, M. Kent)
Adaptive Frequency Response Identification Using the Lagrange Filter
(Y. Tang)
A Parametrization Approach to Optimal H^2 and H∞ Decentralized Control Problems
(R.A. Date, J.H. Chow)
On the Pole Placement with Decentralized Static Feedback
(P. Fessas)
Robust Eigenstructure Assignment via Dynamical Compensators
(G-R. Duan)
Robust Disturbance Decoupling Problem for Parameter Dependent Families of Linear Systems
(G. Conte, A.M. Perdon)
Stability Robustness Characterization and Related Issues for Control Systems Design
(R. Li, E.B. Lee)
Stability Robustness of the Continuous-Time LQG System under Plant Perturbation and Noise Uncertainty
(J.S. Luo, A. Johnson)
Quadratic Stabilizability of Linear Uncertain Systems in Convex-Bounded Domains
(P.L.D. Peres, J.C. Geromel, J. Bernussou)
Transformation of Nonlinear Systems in Observer Canonical Form with Reduced Dependency on Derivatives of the Input
(T.Ph. Proychev, R.L. Mishkov)
A Nonlinear Fuzzy Controller with Linear Control Rules is the Sum of a Global Two-Dimensional Multilevel Relay and a Local Nonlinear Proportional-Integral Controller
(K.J. Hunt, M. Sebek)
Decentralized Estimation and Control with Overlapping Input, State, and Output Decomposition
(A. Iftar)
Spectral Factorization of Linear Periodic Systems with Application to the Optimal Prediction of Periodic ARMA Models
(S. Bittanti, G. De Nicolao)
Steady-State Errors in Discrete-Time Control Systems
(I.W. Sandberg, L.Y. Xu)
On the Generic Controllability of Continuous Generalized State Space Systems
(F.N. Koumboulis, P.N. Paraskevopoulos)
Reachable, Controllable Sets and Stabilizing Control of Constrained Linear Systems
(J.B. Lasserre)
Necessary and Sufficient Conditions for Global Optimality for Linear Discrete-Time Systems
(N.S. Rousan)
The Safety of Process Automation
(A. Toola)

Technical Communiques

Controller Design Using Fuzzy Logic - A Case Study
(K.H. Kienitz)
A Non-Conservative Stability Test for 2x2 MIMO Linear Systems Under Decentralized Control
(B.E. Dainson, D.R. Lewin)
Comments on 'Absolute Stability and the Aizerman Conjecture'
(X. Kaiqi)
Reply to 'Comments on Absolute Stability and the Aizerman Conjecture'
(L.T. Grujic)

Book Reviews

Vector Lyapunov Functions and Stability Analysis of Nonlinear Systems, Mathematics & Its Applications, Vol 63, by V. Lakshmikantham, V.M. Matrosov and S. Sivasundaram
(P.C. Ojha)
Control Sensors and Actuators, by C.W. de Silva
(M. Machacek)
Adaptive Filter Theory, 2nd Edition, by S. Haykin
(B. Wittenmark)
Computational Methods for Linear Control Systems, by P.H. Petkov, N.D. Christov and M.M. Konstantinov
(A. Varga)
Decentralized Control of Complex Systems, Mathematics in Science and Engineering, Vol 184, by D.D. Siljak
(R. Li)

WHO IS WHO IN IFAC

Professor Michael J. Rabins
Chairman TC on Education

A citizen of the United States, Mike, as he prefers to be called, was born (1932) and raised in New York City. Since leaving New York to attend M.I.T. for his B.S. degree in Mechanical Engineering he has travelled widely. He received his M.S. from Carnegie Mellon University and Ph.D. from the University of Wisconsin at Madison. He has been a tenured professor of Mechanical Engineering at New York University, Brooklyn Polytechnic, Wayne State University and Texas A&M University; and had extended visits at the University of California at Berkeley, the Polytechnic Institute Grenoble and the University of Tokyo. He had a further international experience in India, teaching instrumentation one summer on a U.S. Agency for International Development project. So, Mike feels quite at home in the far flung activities of the International Federation of Automatic Control.

While pursuing his career in academia, he has still made time to gain industrial experience through summer employment and consulting arrangements with a number of firms including Bell Telephone Labs, IBM, Oak Ridge National Laboratory, Singer General Precision and over a dozen other firms (inlcuding two toy companies). For two years, from 1975 through 1977, Mike took off from academia to direct the office of University Research in the U.S. Department of Transportation. He was recognized for these efforts with the DOT Award for Superior Performance in 1976 and the DOT Secretary's Award in 1977. In 1978 he was a member of an American Automatic Control Council exchange visit team to the USSR.

He is the co-author (with Y. Takahashi and D. Auslander) of two textbooks on automatic control; has written or co-written some 30 papers, mostly on automatic control; 12 reports; and 7 monographs. In 1971 he became the founding editor of the ASME Journal of Dynamic Systems, Measurement and Control after eleven years of 'learning the ropes' in the ASME 'Dynamic Systems and Control Division'. This led to his serving ASME as their director on the Board of Directors of the American Automatic Control Council (AACC), the U.S. IFAC National Member Organization (NMO). From 1983 through 1985 he served as president of AACC.. He is a senior member of the IEEE, a Fellow of the Engineering Society of Detroit and a Fellow of the ASME. He has been active in the latter organization as a Vice-President, Board of Governors member and, currently, member of the ASME Committee on Program Review. In 1991 he received the AACC Education Award. For the last three years he served as chairman of the IFAC Education Committee, and he looks forward to continuing efforts on behalf of IFAC.

After fourteen years in academic administration Mike has returned to teaching and research full time. For the past few years he has initiated research and writing projects in the new field of 'Engineering Ethics.

FORTHCOMING EVENTS

1993
No. 1
Feb.

Title	1993	Place	Deadline	Further Information
IFAC Workshop Production Control in Process Industry	March 29-31	Düsseldorf Germany	–	VDI/VDE-GMA, PCPI 93 POB 101139, Graf Recke Str. 84 D-4000 Düsseldorf 1, Germany
IEEE/IPJS/SICE/IFAC Symp. Autonomous Decentralized Systems-ISADS	March 30 April 1	Kawasaki Japan	–	Dr. K. Mori, ISADS Secretary Systems Development Lab. Hitachi Ltd, 1099 Ohzenji, Asao Kawasaki 215, Japan
IMACS/IFAC Conference Mathematical and Intelligent Models for System Simulation	April 12-16	Brussels Belgium	–	MIM-S '93 Lab. d'Automatique, C.P. 165 U.L.B., av. F.D. Roosevelt 50 B-1050 Brussels, Belgium
IFAC Workshop Intelligent Autonomous Vehicles	April 18-21	Southampton UK	–	Prof. C.J. Harris, Dept. of Aero&Astro. Highfield, Univ. of Southampton Southampton SO9 5NH, UK
IFIP/IFAC Workshop Knowledge Based Hybrid Systems in Engineering and Manufacturing	April 20-22	Budapest Hungary	–	KNOWHSEM 93 Conf. Secretariat Ms. Eva Sos, H A S Kende utca 13-17 H-1111 Budapest, Hungary
1993 American Control Conference in cooperation with IFAC	June 2-4	San Francisco USA	–	Prof. A. Haddad, AACC Secretariat Dept. of EECS, Northwestern Univ. 2145 Sheridan Road, Evanston, IL60208-3118, USA
IMACS/IFAC Workshop Qualitative Reasoning & Decision Technologies	June 15-18	Barcelona Spain	–	Prof. M. Singh, UMIST Computation Dept., Sackville Street Manchester, M60 1QD, UK
1993 European Control Conference (in cooperation with IFAC) ECCA '93	June 28 July 1	Groningen Netherlands	–	ECC '93 Secretariat, c/o J.W.Nieuwenhuis POB 800 NL-9700 AV Groningen, Netherlands
IFIP/IFAC Conference System Modelling and Optimization	July 5-9	Compiegne France	–	INRIA-Rocquencourt - IFIP 93 B.P. 105 F-78153 Compiegne Cedex, France
IFAC WORLD CONGRESS	**JULY 19-23**	**SYDNEY AUSTRALIA**	–	**The General Manager, IFAC CONGRESS AE Conventions Pty Ltd. Engineering House 11 National Circuit Barton, ACT 2600, Australia Fax: +61 6 273 2012**
IFAC/IFIP/IFORSIEEE/ACM /AAAI Workshop AI in Economics and Management	August 25-27	Portland, OR USA	28 Feb. 1993	Prof. Kuan-Pin Lim, Dept. of EC Portland State University, POB 751 Portland, OR 97292, USA

Title	1994	Place	Deadline	Further Information
IMACS/IFAC Symposium Mathematical Modelling '1st Mathmod Vienna'	Feb. 2 - 4	Vienna Austria	1 May 1993	Prof. Dr. Inge Troch Techn. University of Vienna Wiedner Hauptstrasse 8 - 10 A-1040 Vienna, Austria
IFAC Workshop Man-Environment Integration	Feb. 7 - 9	Lisbon Portugal	15 Sep 1993	Seccao de Urbanizacao e Sistemas Insituto Superior Tecnico Edificio de Engenharia Civil Av. Rovisco Pais P-1096 Lisboa Codex, Portugal
IFAC Symposium (2nd) Modelling and Control in Biomedical Systems	March 27-30	Galveston,TX USA	*	Dr. R. Wolfe, 610 Texas Avenue Galveston, TX 77550, USA

* not yet known

FORTHCOMING EVENTS (ctd.)

Title	1994	Place	Deadlines	Further Information
IFIP/IFAC Intl. Working Conference Knowledge Based Hybrid Systems in Engineering and Manufacturing	April 20-22	Budapest Hungary	1 March 1993	Ms. Eva Sos Computer and Automation Institute HAS, POB 63 H-1518 Budapest, Hungary
IFAC Symposium Intelligent Components and Instr. for Control Applications	June 8 - 10	Budapest Hungary	30 June 1993	Dr. Tamas Boromisza Nat. Comm. for Techn.Development POB 565, H-1374 Budapest, Hungary
IFAC Symposium Fault Detection, Supervision and Safety for Industrial Processes	June 13-16	Espoo Finland	31 May 1993	Prof. B. Wahlström, Techn. Research Centre/VTT, Otakaari 7B SF-02150 Espoo, Finland
IFAC Workshop (2nd) Intelligent Manufacturing Systems	June 22-24	Vienna 22 - 24	15 Feb. 1993	Mrs. J. Hähnel Ö P W Z, Rockhgasse 6 A-1014 Vienna, Austria
1994 American Control Conference (in cooperation with IFAC)	June 29 July 1	Baltimore, MD USA	15 Sep. 1993	Prof. Hassan Khalil Electrical Eng. Dept. Michigan State University East Lansing, MI 48824-1226, USA
IFAC/IFORS Symposium (10th) Identification & System Parameter Estimation SYSID '94	July 4-6	Copenhagen Denmark	Sept. 1993	SYSID '94 Secretariat Danish Automation Society, Bygn. 343 Danish Technical University DK-2800 Lyngby, Denmark
IFAC/IFIP/IFORS Symposium Transportation Systems Theory and Applications of Advanced Technology	July 26-28	Tianjin PRC	*	Prof. Liu Bao, Director Institute of Systems Engg. College of Management Tianjin University, Tianjin 300073 China, P.R.
1994 Asian Control Conference (in cooperation with IFAC)	July 27-30	Tokyo Japan	31 Oct. 1993	Prof. Yasuchika Mori, Dept. of Mech.Engg. National Defence Academy 1-10-20 Hashirimizu, 239 Yokosuka, Japan
IFAC Symposium (3rd) Advances in Control Education	Aug. 1 - 2	Tokyo Japan	1 Sept. 1993	Prof. K. Furuta Tokyo Inst. of Technology Dept. of Control Engg. 2-12-1 Oh-Okayama Beguroku Tokyo 152, Japan
ISPE/IFAC Intl. Conference CAD/CAM: Robotics and Factories of the Future	Aug. 21-24	Ottawa Ontario Canada	*	Ottawa Carleton Research Institute 340 March Road, Suite 400 Kanata, Ont., Canada, K2K 2E4
IFAC Symposium Robust Control Design	Sept. 14-16	Rio de Janeiro Brazil	15 Nov. 1993	Prof. P.M.G. Ferreira, R. Marques de Sao DEE, (PUC-RIO) 22452 Rio de Janeiro, Brazil
IFAC Symposium Robot Control - SYROCO	Sept. 19-21	Capri Italy	Nov. 1993	Prof. S. Nicosia, DIE - 2 Univ. Roma Via Raimondi, I-00173 Rome, Italy
IFAC Workshop Distributed Computer Control Systems - DCCS 94	Sept. 28-30	Madrid Spain	1 March 1994	Prof. Juan de la Puente ETSI Telecommunicacion Universidad Politecnica de Madrid E-28040 Madrid, Spain
IFAC Symposium Artificial Intelligence in Real Time Control	Oct. 3 - 5	Valencia Spain	20 Dec. 1993	Prof. A. Crespo, Dept. Ingenieria Universidad Politecnica de Valencia POB 22012, E-46071 Valencia, Spain
IFAC Workshop Trends in Hydraulic and Pneumatic Components and Systems	Nov. 15-16	Chicago USA	*	AACC Secretariat, Prof. A. Haddad Dept. of EECS, Northwestern Univ. 2145 Sheridan Road Evanston, IL 60208-3118, USA

*** not yet known**
- past