IFAC International Federation of Automatic Control
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1989
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June

Newsletter

Contents:

Informal Meeting of the IFAC Presidents
27 - 29 April, 1989
Laxenburg, Austria

As already a tradition at this time of the year, the 11th Informal Meeting of the IFAC Presidents was held in Laxenburg.

The following persons were present and participated in the deliberations: Prof. B. Tamm, Prof. B.D.O. Anderson, Prof. M. Thoma, Prof. S. Kahne, Prof. L. Ljung, Prof. M. Mansour, Dr. G. Hencsey.

Although no decisions are taken in the course of this meeting, the annual get-together, nevertheless, is an important instrument to establish an exchange of ideas, without having to stick to any formal agenda or rules. In addition, this meeting is also an instrument to get a closer insight into the operations of the IFAC Secretariat on the spot. Furthermore, the Presidents thus get the opportunity to meet IIASA, the Austrian authorities, i.e. representatives of the Ministry of Science, the Academy of Sciences as well as the Austrian NMO and the IFAC Beirat.

An important feature of this meeting was a press conference given by the Presidents for the Austrian media.

IFAC Presidents hold lectures at the "Wissenschaftliche Landes-Akademie" Krems Lower Austria

In the course of their annual meeting, the IFAC Presidents were invited by the above Science Academy, the IFAC Beirat, and the Austrian NMO of IFAC to hold lectures. The IFAC Presidents spoke on the following subjects:
Artificial Intelligence in CAD (Prof. B. Tamm)
Development Trends of Controller Design (Prof. B.D.O. Anderson)
Trends in the Field of Computer Control (Prof. M. Thoma)
Feedback Control Issues in Ion Beam Micromachining Processes (Prof. S. Kahne)
Robust Control and Perspectives of its Application (M. Mansour)
Models for Control Systems Incorporating Logics and Symbolics (Prof. L. Ljung)
At the end of the lecture series there was an interesting discussion with vivid participation from the audience.

Safety of Computer Control - SAFECOMP '88
Safety Related Computers in an Expanding Market
IFAC/IFIP Symposium
9 - 11 November, 1988, Fulda, FRG

The Symposium gathered about 100 participants from more than 10 countries. The main computer application areas were from nuclear power plants and railways. A less strong, but remarkable participation was from the airplane and space side. Attendees were from industry, assessing bodies or universities. Interest from the chemical industry and car manufacturers was less than expected.
The symposium was one in a series that started in 1979. The original frequency was one in three years. Now the frequency is increased to one per year. The preceding event was in Sarlat, France in 1988. The next one will be in Vienna, Austria, in December 1989. The IFAC Committee on Computers has always acted as the main sponsor.
The presentations dealt with the major aspects of safety-related computers: building such systems, documenting them, having them licensed and operated. Principal questions as well as case studies and tools were addressed. A considerable portion of the presentations came from EWICS TC7, explaining the developed pre-standards. A rather subjective selection of other important conbributions is:
- computer reliability requirements in the airplane and space industry;
- quality management of software, problems in introducing quality management systems in existing organizations and related tools;
- tools helping not only to verify the correctness of computer code, but the design documents as well and assisting in the verification of machine code;
- thinking traps during programming;
- formal verification;
- various aspects of software diversity.

The different views about preference of deterministic versus probabilistic verification strategies were addressed at many occasions during the event. It was in particular the panel discussions that tried to bring more light into that question. The result was a little move of the views towards systematic approaches. It was felt, however, that the synergism of all methods was most likely to bring the best results. This was supported in particular by the report of a related experiment from the US.
It was very difficult to find an overall conclusion on what were the most important problems. A slight majority thought that the human aspects, mainly the human error making aspects in their various shapes, posed the outstanding questions. Other important topics were methods and standards for specification, construction and verification of safety related computer systems. Software problems were thought to be more important than hardware problems. In the future most help is expected from standards and tools.
During the next event in that series, more emphasis will be put on other areas of application, beyond transportation and nuclear power. It will also include aspects of data security and artificial intelligence.

W. Ehrenberger, IPC Chairman

Report Future Directions in Control Theory

The future of the control field is of course an issue of great importance to us all. Our technical committees' work really aims at planning for that future. SIAM (Society for Industrial and Applied Mathematics) has issued an interesting study on this topic from a mathematical perspective.

A major report on the status and future directions of control theory, entitled "Future Directions in Control Theory: A Mathematical Perspective" was released in December 1988 and is being distributed by the Society for Industrial and Applied Mathematics (SIAM). Wendell H. Fleming of Brown University chaired the panel of 17 mathematicians and engineers which produced the report. During various stages of its preparation the panel solicited and received valuable input from over 50 members of the control community.

Control theory has grown dramatically from the linear systems, optimum control and linear filtering of noisy signals of the 1960's into a vastly diverse family of theories of nonlinear, stochastic, adaptive, distributed parameter, discrete event and intelligent control. Because control research is driven by the diverse and changing needs of applications, the wide variety of mathematical techniques included in control theory go beyond those associated with traditional applied mathematics.

Control theory faces particular challenges arising from its diverse origins and the wide applicability of its research. The field is both an engineering discipline and, in addition, is experiencing increasing interaction with computer science and computation. The creative interplay between mathematics and engineering in the solution of control problems has been a major strength of the field, but it also raises questions about the raison d'etre and the future direction thereof.

In spite of the rapid growth of the field, the panel found that many fundamental problems - such as control of nonlinear multivariable systems, especially those with many degrees of freedom, and control of nonlinear distributed parameter systems (e.g. those governed by nonlinear partial differential equations) - are not yet understood. These fundamental problems give rise to diffcult mathematical questions, many of which cannot be answered within the current theoretical framework.

The report describes both striking recent advances in the mathematical theory, such as the robust control theory for linear systems, and successful applications to control technology. Among the latter are the space shuttle control systems, a new hormone therapy that is programmed by a nonlinear feedback linearization and decoupling technique, the fly-by-wire F-16 jet, the hot strip steel mill computer, and a variety of "small" applications that make modern control systems pervasive in today's technological environment.

The report also identifies a strikingly diverse range of areas in science and technology that could benefit from research in control theory. Among them are: robotics, combustion control, fluid flow control, solidification processes, biomedical research, hydrology and economics.

The report strongly encourages control scientists to make the fullest possible use of advanced scientific computing as a research tool. It predicts that major new advances may become possible because of the dramatic increases in computing power, the proliferation of new computing tools, and, to some extent, the availability of new sensor technologies which open up new possibilities for data collection and experimental research on control.

The panel avoided the all-too-easy approach of calling US federal government agencies to double or triple the dollar amounts spent on research in this area, relying, instead, on the importance of the field and the continuing high quality of research as the guarantors of future funding. Questions were raised, however, about the continuing supply of young talent, training opportunities and communication barriers.

The panel recommended that academic institutions promote the development of the field by training Ph.D.s in both mathematics and engineering and by facilitating communication across departmental lines. The success of such programs depends on the critical mass of faculty interested in control research.

The panel further recommended that the mathematical and engineering aspects of fundamental control research become an integral part of new research initiatives sponsored by the federal agencies in many areas of science and technology, such as robotics, space structures and computation.

The control science community, the academic institutions and the federal agencies were encouraged to promote a greater exchange of ideas among mathematicians, engineers and computer scientists. One of the goals in this area is integration within the field to overcome the internal communication barriers; another one is facilitation of the flow of ideas from other rapidly progressing fields of mathematics into control theory.

Members of the panel were: H.T. Banks, G. Blankenship, R. Brockett, J.A. Burns, W.H. Fleming, R.V. Kohn, A. Krener, A.J. Laub, J.L. Lions, S. Markus, J.E. Marsden, S. Mitter, E. Polak, R.T. Rockefellar, D. Russel, E.D. Sontag and G. Stein.

In the process of assembling the report, it has become clear that perceptions of the future directions vary widely among the members of the control science community. For instance some believe that the field will evolve more in the direction of software engineering, artificial intelligence and intelligent control, with mathematical research taking second place to computer science. These views, however, were not strongly emphasized in the report. In fact, the report definitely takes a mathematical perspective and emphasizes the need to continue the creative interaction of mathematics, computation and engineering.

Copies of the report can be obtained by writing to:
Customer Service
SIAM
117 South 17th Street
14th Floor
Philadelphia, PA 19103-5052
USA

Distributed Computer Control Systems - DCCS '88

IFAC Workshop

13 - 15 September 1988, Vitznau, Switzerland

The 8th annual DCCS-88 Workshop has upheld the tradition established by its predecessors: 20 presentations grouped around 5 major topics once again highlighted major trends and developments in the field of distributed computer control systems.

As in previous workshops it has been fascinating to extract a common set of rules and tendencies from seemingly very diverse papers submitted by authors of a wide variety of backgrounds, both geographically and occupationally. This was further emphasized by the attendance of more than 40 participants originating from 14 countries, more than 80 % of whom arriving from outside the host country.

The five major topics of the DCCS-88 Workshop can be summarized as follows:
- field buses
- theoretical aspects and basic mechanisms
- fault tolerance and error recovery
- distributed expert systems
- CIM

The presentations conducted on field buses clearly showed the following complementary aspects:

- replacement of cabling
- interface to connect sensors and subsystems
- high-speed link between process stations

The basic mechanisms displayed various aspects of distributed systems, with the remote procedure call mechanism assuming a major role in several papers.

The papers addressing error treatment were also very well-directed and emphasized the aspects of:
- fault avoidance
- fault tolerance
- fault recovery

A very significant aspect was revealed by the expert systems papers: The organization of cooperating (distributed) expert systems. This is truly a novel aspect which could become a major development of future systems, since it will allow for the combination of expert systems, rather than the construction of huge "super" systems.

Although the DCCS-88 Workshop focused mainly upon more continuous-type applications than in the past, CIM applications are starting to proliferate and mature, while similarities between the two kinds of applications become employable. Batch control systems can be viewed as combinations of both "worlds", thus each deserving substantial attention. For this reason, it proved both interesting and necessary to conclude the workshop with selected topics on CIM.

It will, however, remain an important and challenging task in future DCCS workshops to establish a strategy of how, where and in which form to include presentations in this field.

T. Lalive d'Epinay
NOC Chairman

Artificial Intelligence in Economics and Management

IFIP/IFAC/IFORS Workshop

9 - 13 January, 1989
Singapore

The 2nd International Workshop on Artificial Intelligence in Economics and Management was held at the Institute of Systems Science, National University of Singapore. Dr. Tay Eng Soon, Senior Minister of State for Education opened the meeting. The keynote speech on Artificial and Natural Intelligence in Business Decision Making was delivered by Professor Herbert Simon, Nobel Laureate, Carnegie Mellon University.

Tutorials 9 - 10 January
The first two days of the Workshop were devoted to tutorial sessions presented by top researchers from the select AI community. The sessions covered Application of Neural Nets by Professor Yoh Han-Pao, Case Western University; Introduction to AI by Professor Teh Hoon Heng, Institute of Systems Science, National University of Singapore; Application of AI in Manufacturing by Mark Fox, Carnegie-Mellon University; AI & Financial Services by Professor L.F. Pau, Technical University of Denmark and AI & Information Retrieval by Professor Nick Belkin, Rutgers University.

Workshop 11 - 13 January
The acceptance ratio was very strict at 1 paper accepted out of every 3, and 43 papers were presented at the Workshop. Of these, approximately 40 % were from the US and the rest reflected a truly international gathering and included authors from Australia, Canada, China, Europe, Japan, Korea, Malaysia, the Middle East, Singapore and South America. The Workshop was wide-ranging, taking in such topics as Software Engineering, Banking, Finance, AI Methodology, Organizational Structure and Strategy, User Interface, Planning and Scheduling and Manufacturing.

Panel Discussions
There were 2 panel sessions:
a) AI Education for Finance and Economics
b) Industry

a) The first panel session comprised experts from NEC Company, University of Sydney, University of Paris II, University of Texas, University of Amsterdam, Technical University of Denmark and the Institute of Systems Science. The panel presented their views on two issues 1) AI training as part of the normal Computer Science education and 2) AI is a specialized area, hence one can go straight to applications without having to go through the normal training. The panel provided balanced views on both issues and concluded that the nature and needs of an organization were instrumental in deciding the right path.
b) Industry was well represented by senior executives.

The Workshop was undoubtedly an unqualified success. It provided participants with insights into the latest AI developments and an excellent introduction to the issues and directions surrounding new AI technologies. The rapidly developing industries in the region will no doubt derive tremendous benefit from the tutorials as well as the exchange of experiences and the promotion of an understanding of current research.

Juzar Motiwalla, Conference Chairman

Reliability, Availability and Maintenability of Industrial Instrumentation Systems

IFAC Workshop

28 - 30 Sept., 1989, Bruges, Belgium

After the closing of the First Workshop at The Hague in May 1986, the Organizing Committee, in agreement with the IPC chairman, felt that the interest and the attendance stimulated to continue the workshop towards another issue. Consequently, from 28-30 September 1988, the beautiful historical city of Bruges hosted the second event. This time, the workshop was organized by the Belgian Institute of Automatic Control (the Belgian NMO of IFAC).

The industrial world is regularly confronted with important issues about RAM. Some weeks before the workshop at The Hague, there was the Tchernobyl disaster: It clearly demonstrated the importance of reliability, safety, risk-analysis, etc. Now, two years later - is there any progress? Recently there was the Piper Alfa calamity. An investigation of this disaster clearly sent out the message that the ultimate inferno was the result of a sequence of accidents, and that it could have been avoided if an a-priori reliability study and risk analysis had been performed. Such lessons are very hard to deal with and again show the tremendous importance of reliability in industry. Not only for industrial cost and losses but especially for human lives, reliability aspects are ever more urgent in an industrial environment where processes are increasingly operated at the limits of their potentials.

The local organizing committee, in agreement with the IPC chairman, decided on launching this second event and opening up somewhat the scope (as is illustrated by the title of the workshop). The scope now clearly reflects the overall aspects of RAM which in one way or the other are strongly related to each other. Although RAM can obviously not be divided into small classes, the lectures at the workshop were lined up into three main sessions, with one tutorial on the first two and two tutorials on the last session:
- industrial process control systems for safety applications (including fault tolerance) on the first day;
- expert systems and diagnostics on the second day;
- reliability procedures and guidelines on the third day.

Besides the tutorial, each session contained many papers which were qualified as high-standard by the IPC both from the theoretical point as well as from the experimental aspect. There were 27 papers in total for a largely international audience of over 100 participants. They came from Finland to New Zealand and from Texas to Japan.

Not only surveys were presented from the basis of reliability and availability theory and aiding techniques such as expert systems and software developments, but also interesting experience from people working in a wide spectrum of areas ranging from mathematics to engineering and in different countries was discussed. The interaction achieved through these discussions was enormous. The presentations were carefully prepared and presented and of high quality.

The lesson to be learnt is the following: all over the world, mankind is facing similar problems in the application of theoretical results. Another conclusion is that not all of the models developed have been validated and much work yet remains to be done. Progress in the field of reliability may perhaps not be spectacular but rather a step-by-step process. In contrast to reliability, cases of non-reliability are generally quite spectacular. The continuous work that is characterized by gradual improvement of knowledge and tools generally goes rather unnoticed.

Tibor Vamos, former President of IFAC, told us about the IFAC family. During the days in Bruges all participants had the impression that they formed part of that family. Due to the efforts of the Belgian organizers, stimulating communication in an animated and good social atmosphere was possible and made this IFAC feeling present everywhere. Meeting colleagues from abroad remains a fruitful basis for our daily work.

A critical note perhaps directed at the address of other IFAC National Member Organizations. Looking at the list of participants, one may see that there were 16 countries from 4 continents represented in Bruges, with a majority from Belgium and the Netherlands. With the emphasis on countries neighbouring Belgium i.e.France and Germany, there must be a greater number of technicians working in reliability than related to the participation in this workshop.

How can we reach them? Did the NMOs do enough to inform these potential participants? A well-directed information flow to the interested scientist or engineer is crucial for a successful operation.
In addition, there is a huge reservoir of hard-working scientists who rarely or never present results of their work in public. How can we activate these people? This will be a challenging task for a probable next organizing committee.

The Hague 1986, Bruges 1988, what will be next?
There have been some signals in the corridors of the workshop. It seems that it will be possible and desirable to organize a further workshop. Probably in the region where Belgium, the Netherlands and West Germany are bordering.

ir. E.T. van Ravenzwaaij, IPC Chairman
Prof.dr.ir. L. Boullart, NOC Chairman

The IFAC/RAM Community at the historical Town Hall of Bruges

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The Journal of IFAC the International Federation of Automatic Control

Papers from the Next Issue - June 1989

Papers

Telerobotics
(T.B. Sheridan)
Composite Adaptive Control of Robot Manipulators
(J.J.E. Slotine, W. Li)
Robustness of Multipredictor Adaptive Regulators: MUSMAR
(E. Mosca, G. Zappa, J.M. Lemos)
Quadratic Regulatory Theory for Analytic Nonlinear Systems with Additive Controls
(T. Yoshida, K.A. Loparo)
Sequential LQG Optimization of Hierarchically Structured Systems
(S.S. Stankovic, D. Siljak)
Stability Analysis of Large Scale Systems Composed of Strongly Coupled Similar Subsystems
(J. Lunze)
Qualitative Reasoning: Modelling and Simulation with Incomplete Knowledge
(B. Kuipers)

Brief Papers

Nonuniqueness of No-Memory Feedback Equilibria in a Fishery Resource Game
(V. Kaitala)
Explicit Self-Tuning Control for a Class of Nonlinear Systems
(J. Zhang, S. Lang)
Steady State and Parameter Tracking Properties of Self-Tuning Minimum Variance Regulators
(M. Niedzwicki)
Smoothness Priors Transfer Function Estimation
(W. Gersch, G. Kitagawa)
Convergence Analysis of the Least Squares Identification Algorithm with Variable Forgetting Factor for Time Varying Linear Systems
(R.M. Canetti, M.D. Espana)
Robust Combined Estimation of States and Parameters of Bilinear Systems
(H. Dai, N.K. Sinha, S.C. Puthenpura)
Multidimensional State Estimation Using Stacks for Dynamic Systems with Interference
(K. Domirbas)
Control of Constrained Discrete Time Linear Systems Using Quantized Controls
(M. Sznaier, M.J. Damborg)
H^2 -Optimization with Stable Controllers
(C. Ganesh, J.B. Pearson)
Minimization of a Combined $H\infty$ and LQG Cost Function for a Two Dregrees of Freedom Control Design
(M.J. Grimble)

Book Reviews

Stochastic Differential Systems, Analysis and Filtering, by V.S. Pugachev & I.M. Sinitsyn
(A. Bagchi)
Mobile Control of Distributed Parameter Systems, by A.G. Butkovbsky & L.M. Pustyl'nikov
(S. Pohjolainen)
Tasks, Errors and Mental Models - A Festschrift for Jens Rasmussen, by L.P. Goodstein, H.B. Andersen & S.E. Olsen (Editors)
(G. Weir)

IFAC Working Group

Transportation Systems of the TC on Systems Engineering

Scope and activities
The Working Group on Transportation Systems is attached to the Technical Committee on Systems Engineering and has the following scope.
The exchange of ideas and dissemination of research results on large-scale, complex, transportation systems. The technical scope includes system design, modelling simulation, testing, evaluation, long-range planning as well as system analysis including formulation, structuring, information handling and organization of such systems. The approaches range from the application of automatic control theory to the consideration of social values and economic factors.
The objectives are to foster the interdisciplinary exchange of ideas, to foster coordinated solutions for transportation problems, to stimulate discussions between managers with problems and scientists, to inform management, also considering developing countries, what the methods can do, and to motivate scientists to become more involved in these fields.

The intention is given that the different areas of transportation, the different countries and the fields of research, planning and operation are represented by the members. At present, 11 countries are represented by 16 members. Currently, Mr. J.P. Perrin, RATP, France, (Autonomous Administration of Paris Transport) is chairman.

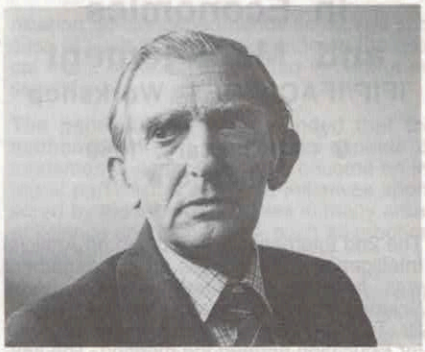
Great importance is given to liaison to other groups. This is realized by having members, e.g. in the IFIP Working Group on Transportation Systems (belonging to the IFIP Committee on Computer Applications in Technology), the Airway Group of IFORS, the Technical Committee (7) on Safety, Security and Reliability of EWICS and in the national or transnational associations in transportation.
Beginning with the 5th IFAC Congress in Boston, USA, in 1975, the Working Group has had the responsibility of organizing the sessions on transportation systems at the Triennial World Congresses of IFAC. The responsibility for the series of IFAC/IFIP/IFORS Symposia on Traffic Control and Transportation Systems started with the third one in Columbus, Ohio, USA in 1976.

The main impact of the IFAC/IFIP/IFORS Symposia on Traffic Control and Transportation Systems has been
1970, Versailles, France: Control theory and optimization for traffic flow and vehicles
1974, Monte Carlo: Progress to aspects of previous symposium and reliability approach
1976, Columbus, Ohio, USA: Approach of using electronics and process computers in safety related systems
1983, Baden-Baden, FRG: Handling fuzzy information and automation in safety related systems
1986, Vienna, Austria: Systems engineering approach for national transportation systems and logistics
1989, Paris, France: Growing together of computers, communications and control.

The correlation is evident between the quality of systems and the attendance as well as involvement of persons responsible for such systems, at meetings with information flows crossing the own limited fields of expertise. For example, some railway administrations, not taking part in such meetings, have a time-lag of 15 years and more concerning the application of advanced control or optimization methods.

Dr. Robert Genser

WHO IS WHO IN IFAC



Prof. A.H. Prime
Chairman of TC on Terminology

Prof. Prime was born in Manchester, UK in 1921. He entered the University of Manchester on a scholarship to read Physics in 1939 and graduated B.Sc. in 1942. From 1942 to 1946 he was attached to the Admiralty Surface Weapons Establishment, (then A.S.E.), to work on naval radar ranging and display systems. The degree of M.Sc. was conferred in 1946. From 1946 to 1950 he held a lectureship in electronic engineering at the University of Liverpool, where his research work was primarily in the area of recording fast transient phenomena in gas discharges. From 1950 to 1955 he held a Senior Lectureship at the University of Adelaide, Australia but then returned to the UK following an invitation to take up a post as Chief Electronics Engineer with Brush Electrical Engg. Co (Hawker Siddley Group). Subsequently he became Manager of the Control Division of that corporation. During this period he was responsible for the design of the control systems for a number of large steerable antennas, including the Joddrel Bank and the first Goonhilly systems. In 1963 he was appointed to a Chair in Electronic Engineering at the University in Birmingham, where his work in the field of Systems Engineering continued. In 1973 he became Head of the Department of Electronic & Electrical Engineering, a position he held until 1985, prior to his retirement in 1986. From 1975-78 he served as Dean of the Faculty of Science & Engineering and from 1978-82 as Pro-Vice Chancellor of the University. Prof. Prime is a Fellow of the Institution of Electrical Engineers and has been a member of the Council of that Institution from 1974-77; 82-84; and 85-88. He also served as Chairman of the Computing and Control Division of the I.E.E. for the session 82-83 and he is currently a member of the Qualifications Board of the I.E.E. In 1971 he was a Visiting Professor at the University of Hannover and Eindhoven. Most recently, he has become associated with the IFAC T.C. on Terminology at the Budapest Congress and assumed the chairmanship of that T.C., following the most untimely death of Prof. Solheim. In retirement, he is continuing his research in the systems area.

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IFAC

1989
No. 3
June

FORTHCOMING EVENTS

Title	1989	Place	Deadlines	Further Information
IFAC/IMACS Workshop Computer-Aided Control Systems Design	June 19-25	Alma Ata USSR	-	Dr.V.I. Venets USSR National Committee of Automatic Control, 65 Profsojuznaja ul 117806 Moscow, GSP 7, USSR
IFAC/IMACS/IFIP Symposium (5th) Control of Distributed Parameter Systems	June 26-29	Perpignan France	-	IMP/CNRS Univ. de Perpignan F-66000 Perpignan, France
CNR/IFAC/SIAM/IEEE Conference The Riccati Equation in Control Systems and Signals	June 26-28	Como Italy	-	Riccati Workshop Villa Olmo, Via Cantoni 1 I-22100 Como, Italy
IFAC/IFORS/IFIP/SEDC Conference Dynamic Modelling and Control of National Economies	June 27-29	Edinburgh UK	-	Conference Division Inst. of Measurement & Control 87 Gower Street, London WC1 6AA, UK
IFAC/IFORS/IMACS/IEEE Intl. Conf. Advanced Information Processing in Automatic Control - AIPAC 89	July 3-7	Nancy France	-	CRAN IFAC Congress Secretariat Faculté des Sciences, BP 239 F-54506 Vandoeuvre Cedex, France
IFIP/IFAC Conference (14th) System Modelling and Optimization	July 3-7	Leipzig GDR	-	Dr. K. Tammer, Leipzig Univ. of Techn., Dept. of Math. & Informatics POB 66, DDR-7030 Leipzig, GDR
IFAC Symposium (11th) Automatic Control in Aerospace	July 17-21	Tsukuba Japan	-	Prof. T.Tanabe, Dept. of Aeronautics University of Tokyo, Fac. of Engg. 7-3-1 Hongo, Bunkyo-ku, Tokyo 113 Japan
IFAC Workshop Singular Perturbations and Asymptotic Methods in Systems and Control	August 17-18	Boston MA, USA	-	Prof. M. Ardema, Dept. of Mech.Engg. Santa Clara University Santa Clara, CA 95053, USA
IFAC/EFCE Symposium Dynamics and Control of Chemical Reactors, Distillation Columns and Batch Processes	August 21-23	Maastricht Netherlands	-	DYCORD+ '89 c/o Klvl, POB 30 424 NL-2500 GK The Hague The Netherlands
IFAC Symposium Power Systems and Power Plant Control	August 22-25	Seoul Korea	-	Prof. Jang Gyu Lee Dept. of Control&Instr. Engrg Seoul Nat. Univ., Seoul 151-742, Korea
IFAC Workshop Expert Systems and Signal Processing in Marine Automation	August 28-30	Copenhagen Denmark	-	Danish Automation Society Bldg 343, Techn. University of Demark DK-2800 Lyngby, Denmark
IFAC/IFORS/IMACS Symposium Large Scale Systems: Theory and Applications	August 29-31	Berlin GDR	-	WGMA, Kammer der Technik Clara Zetkin Str. 115/117 DDR-1086 Berlin, GDR
IFAC Workshop Decision Support for Patient Management: Measurement, Modelling and Control	Aug.31 Sept. 2	London UK	-	IFAC - BME 89 Bell Howe Conferences Gothic House, Barker Gate Nottingham NG1 1JU, UK
IFAC Symposium (6th) Automation in Mining, Mineral and Metal Processing	Sept. 4-8	Buenos Aires Argentina	-	Dr.J. Paiuk c/o AADECA Av.Callao 220 10B 1022 Buenos Aires, Argentina
IFAC/IFIP/IEA/IFORS Conf. (4th) Analysis, Design and Evaluation of Man-Machine Systems, MMS '89	Sept. 12-14	Xian PRC	-	MMS 89 Secretariat c/o Prof. Hu Baosheng Xian Jiaotong University Xian, Shaanxi, PRC
IFAC/IFIP/IFORS/CIRP Workshop Decisional Structures in Automated Manufacturing	Sept. 18-21	Genoa Italy	-	Prof.A.Villa, Dip.Tecnologia e Sistemi di Produzione, Politecnico di Torino, corso Duca degli Abbruzzi 24 I-10129, Italy
IFAC Workshop (2nd) Artificial Intelligence in Real-Time Control	Sept. 19-21	Shenyang PRC	-	Ms. Chen Da-yang Conf. Centre for Science & Techn. No.3, Li 3, Section 4 Minzu Street Heping District, Shenyang, PRC
IFAC/IFIP/IFORS Symposium Control, Computers, Communication in Transportation - CCCT '89	Sept. 19-21	Paris France	-	AFCET -CCCT '89, 156 blvd Péreire, F-75017 Paris, France

FORTHCOMING EVENTS (ctd.)

Title	1989	Place	Deadlines	Further Information
IFAC Workshop Systems Structure and Control: State Space and Polynomial Methods	Sept. 25-27	Prague CSSR	-	IFAC Workshop Inst.of Inf. Theory&Automation Pod vodarenskou vezi 4 CS-182 08 Prague, CSSR
IFAC Workshop (9th) Distributed Computer Control Systems - DCCS '89	Sept. 26-28	Tokyo Japan	*	Prof. S. Narita, Waseda University Dept. of Electr. Engg., 3-4-1 Okubo Shinyuku-ku, Tokyo 160, Japan
IFAC/IFIP/IMACS/IFORS Symposium (6th) Information Control Problems in Manufacturing Technology	Sept. 26-29	Madrid Spain	-	INCOM '89, E.T.S. Ingenieros Industriales, Po. Castellana, 80 E-28006 Madrid, Spain
IFIP/IFAC Conference Computer Applications in Production&Engineering CAPE 89	October 2-5	Tokyo Japan	-	Conference Secr. CAPE 89 c/o Conf.Dept.; Business Ctr. f. Academic Societies Japan 2-40-14 Hongo, Bunkyo-ku Tokyo 113, Japan
IFAC Workshop Distributed Databases in Real Time Control	October 16-18	Budapest Hungary	*	Dr.E.Knuth, Computer&Aut.Inst. HAS, POB 63, H-1502 Budapest Hungary
IFAC Workshop Evaluation of Adaptive Control Strategies in Industrial Applications	October 16-20	Tbilisi USSR	-	Dr. V.I. Venets 65 Profsojuznaja ul. 117806 Moscow, GSP 7, USSR
IFAC Workshop (16th) Real Time Programming	October 18-20	Berlin GDR	June 1 1989	WRTP 89 WGMA, Kammer d. Technik Clara Zetkin Str. 115/117 DDR-1086 Berlin, GDR
IFAC/IFIP Workshop Energy Systems, Management and Economics	October 25-27	Tokyo Japan	-	ESME '89 Secretary Dr.Kenji Yamaji, Central Res. Institute of Electric Power Industry 1-6-1 Ohtemachi, Chiyoda-ku Tokyo 100, Japan
IFAC/IFORS Workshop Production Control in Process Industry	Oct.30 - Nov. 2	Kyoto Japan	*	Prof. T.Takamatsu, Kyoto University Japan Inst. of Systems Research 4, Yoshida-Ushino-miya Sakyo-ku Kyoto 606, Japan
IFAC/IFIP Symposium Low Cost Automation: Techniques, Components& Instruments, Applications	Nov. 8-10	Milan Italy	-	IFAC-LCA '89 Secretariat Dip.Informatica e Sistemistica Via Eudossiana 18 I-00184 Rome, Italy
IFAC/IFIP/(IMACS) Symposium Skill Based Automated Production	Nov. 15-17	Vienna Austria	-	Austrian Center for Productivity and Efficiency - OEPWZ Rockhgasse 6, A-1014 Vienna, Austria
IFAC/IFIP Workshop Safety of Computer Control Systems - SAFECOMP '89	Dec. 5-7	Vienna Austria	-	Austrian Center for Productivity and Efficiency - OEPWZ Rockhgasse 6, A-1014 Vienna, Austria

Title	1990	Place	Deadlines	Further Information
IFIP/IFAC Intl. Conference Modelling the Innovation: Communications, Automation &Information Systems	March 21-23	Rome Italy	-	Conf. Secretariat, c/o Dr.A Tornambe, Fondazione Ugo Bordoni via Baldassarre Castiglione 59 I-00142 Rome, Italy
JSME/IFAC Intl. Conference Manufacturing Systems and Environment Looking Toward the 21st Century	May 29 - June 1	Tokyo Japan	July 31 1989	T. Nakajima, The Japan Society of Mechanical Engineers, Sanshin Hokusei Bldg, 4-9 Yoxogi 2-chome Shibuya-ku, Tokyo 151, Japan
INRIA/IFAC/IEEE/SIAM 9th Intl. Conference Analysis and Optimization of Systems	June 12-15	Antibes France	Oct. 1 1989	INRIA, Service des Relations Exterieure, Domaine de Voluceau Rocquencourt, BP 105 F-78153 Le Chesnay Cedex, France
IFORS/IFIP/IFAC Intl. Conf. Economics and AI CECOIA II	July 2-6	Paris France	*	Dr.P. Bourgine, CEMAGREF 26, rue St. Louis, F-78000 Versailles
XIth IFAC World Congress Automatic Control at the Service of Mankind	Aug. 13-17	Tallinn USSR	-	IFAC '90 Congress Secretariat Inst. of Cybernetics Akadeemia tee 21 Tallinn 2oo109, USSR

* not yet known
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