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IFAC Congress 1984

Industrial Problem Sessions

Since the early days of IFAC's history there has been continuous talking and fretting about IFAC being too theoretical and thus not giving anything to the ordinary mill-floor control engineer with his tough and complex problems of everyday practical life. The IFAC 9th World Congress organizers, fully aware of the situation, made a bold and far-ranging decision. In the initial stages of their work, they decided to organize a string of sessions on these industrial problems.

The ensuing preparatory work, carried out under the able and experienced guidance of the former IFAC President, U. Luoto (Helsinki), proceeded through many delays and difficulties, finally producing the series of ten Industrial Problem Sessions, plus the 11th, Concluding Session, for the Budapest Congress Program.

This Industrial Problem Session string, two or three sessions each Congress day, aroused much interest among the participants. An estimated 300 to 350 persons attended this session string. In other words roughly every fourth Congress participant attended at least one of the Industrial Problem Sessions.

The organizers distributed at each Session a Participant Enquiry Form of which many

were returned properly filled in. An analysis of the returned replies indicates that this new string of sessions was very well accepted by the participants. Only few indicated negative opinions, the main claim being that some of the discussions following the Panel presentations were somewhat unstructured. Also, some of the topics discussed were criticised.

On the other hand, the favourable opinions expressed indicate clearly that a repetition of the string be desirable in the programs of future Congresses. In this context it was further proposed that the future IP-Sessions would have to be better prepared in advance, the main items of the discussions to be known beforehand, panelists selected on a wider basis than was done now etc. Many really valuable and important proposals and advices were recorded.

The most encouraging responses were received, as could be expected, from the industry's control engineers. This clearly indicates that if Industrial Problems be further discussed at the next IFAC Congresses, both the industry's and the industrial control engineers' congress attendance is going to increase significantly.

New IIASA Director appointed

The IIASA governing Council has appointed Professor Dr. Thomas H. Lee, USA, from the Massachusetts Institute of Technology, Member of the National Academy of Engineering, as Director of the International Institute for Applied Systems Analysis (IIASA). He assumed his three-year term at IIASA on September 1, 1984, taking over from Professor C. S. Holling, who, after completion of his three-year term as Director of IIASA, will return to the University of British Columbia in Vancouver, Canada.

Professor Lee, currently also Director of the M.I.T. Laboratory for Electromagnetic and Electronic Systems, has for many years been associated with the General Electric Corporation, where he was responsible for business strategies, as well as for the technological activities in the Power System Sector. He is author of numerous publications in the field of energy research and holder of thirty patents. He was appointed Director of IIASA by an unanimous vote of the IIASA Council, chaired by Academician Jermen M. Gvishiani of the USSR, at its session in June 1984.



IFAC herewith extends its wholehearted welcome and best wishes to the new Director, looking forward to continuing the friendly relations and useful cooperation with its great neighbour in Laxenburg.

The 1st IFAC Symposium on Artificial Intelligence (Industrial Application), Leningrad, USSR, — 4-6 October, 1983.

Continuing the tradition laid by the First and Second International Meetings on Artificial Intelligence (IMAI) which had been held by the USSR Academy of Sciences in Repino, near Leningrad, in April, 1977 and October, 1980, the International Federation of Automatic Control (IFAC) decided to hold the 1st IFAC Symposium on Artificial Intelligence (Industrial Application) in October, 1983 on the same grounds. The decision was supported by the USSR National Committee of Automatic Control and the USSR Academy of Sciences.

The agenda was selected as follows:

- Knowledge Representation and Industrial Expert Systems
- Robots and Flexible Manufacturing Systems
- Decision-Making in Computer-Aided Planning, Design and Control
- Artificial Intelligence Applied Systems.

The symposium was sponsored by the IFAC Technical Committee "Manufacturing Technology" with participation of the IFIP Technical Committee "Computer Applications in Technology".

H.-J. Warnecke (FRG) chaired the Organising Committee, supported by J. Hatvany (Hungary) and I. M. Makarov (USSR), while the International Programme Committee was chaired by G. S. Pospelov (USSR).

The papers invited and chosen for presentation at the symposium were divided into four sessions.

1. Knowledge Representation and Industrial Expert Systems
chaired by D. A. Pospelov and M. Vukobratović.

The 25 papers presented at this session analysed the problems of classification, problem-solving complexity; gave a thorough survey of knowledge representation methods developed for specialized tasks of computer-aided manufacturing; described approaches to industrial expert systems, particularly the development of specialized languages providing for the systems compatibility.

2. Robots and Flexible Manufacturing Systems
chaired by G. Giralt and F. M. Kulakov.

20 papers were presented and different approaches and implementations of robot systems were discussed in application to robot motion, manipulation and visual systems oriented to introduction into computer-aided design and manufacturing processes. In particular problems of application of pattern recognition methods to robot visual systems were represented and some interesting implementations were outlined.

The papers exposed deep analysis of a relation between scientific activities in the field of fundamental research and application of their results to the industrial sphere.

3. Decision-Making in Computer-Aided Planning, Design and Control
chaired by M. Somalvico and V. V. Alexandrov.

Main attention of the 21 papers presented focussed on the systems developed for different applications on the basis of the new approaches to information processing (user-oriented systems for planning, decision-making, problem-solving).

The problems concerning requirements laid down by CAD/CAM development to programming languages and other software products were also discussed at the session.

4. Artificial Intelligence Applied Systems
chaired by E. H. Tyugu and I. Plander (10 papers).

The questions raised during the session were connected with implementation of the systems developed for industrial and other applied fields (chemical investigations, medical diagnostics, etc.).

In addition to the sessions mentioned a Plenary Session was held during which four specially invited presentations were delivered. Plenary papers showed the symposium orientation to a new information technology in the field of Artificial Intelligence (Pospelov G. S., USSR), they gave a thorough analysis of industrial applications of Artificial Intelligence techniques to CAD/CAM of VLSI, 3-dimensional computer graphics in CAD/CAM, diagnostics of anomalies, natural language understanding, speech recognition, computer vision, recognition of manual drawings, objects recognition, robotics (Shirai Y., Japan); Hatvany J., (Hungary) spoke about integral automation, while Somalvico, M., (Italy), stressed the importance of special approaches to problem-solving procedures.

The President of IFAC, Professor T. Vámos delivered the Opening Address to the

symposium in which he stressed the fact that the changing face of Artificial Intelligence methods application drew the attention of the vast circle of specialists to the field; and that the introduction of Artificial Intelligence into design and manufacturing, especially in connection with robotics, should be controlled by human reason in order to avoid extremes which could show up in the course of an uncontrolled growth of technology.

In addition to the formal sessions there was a "round-table discussion" on the second evening of the symposium on "Artificial Intelligence Problems Application to Flexible Manufacturing Systems" under guidance of Prof. W. Bibel, FRG.

Discussion on the problem of "Formal Logical Systems and Logic of Human Reasoning in Manufacturing Control" was initiated by D. A. Pospelov.

Discussion on the problem of "Robotics and Artificial Intelligence" was initiated by G. Giralt and F. M. Kulakov.

The "round-table discussion" was attended by over 100 participants.

The symposium showed not only the progress in traditionally developed methodological and pure research fields of the comparatively new science of Artificial Intelligence but also the fast growth of its importance for different industrial applications. Thus the symposium in general met the purpose set by the sponsors and organizers.

Proceedings of this Symposium are to be published by Pergamon Press.

V. M. Ponomaryov,
Leningrad Research Computer Centre,
USSR

IFAC Workshop on Systems Engineering Approaches in Continuing Education

26th — 28th March 1984, Noordwijkerhout, The Netherlands

This Workshop — the first one dedicated to the field of Systems Engineering Approaches in Control Engineering — was sponsored by the IFAC Technical Committees on Education and Systems Engineering and organized by the Netherlands Foundation for Post-Degree Education in Control Engineering.

The aim of this Workshop was to provide a forum for in-depth discussions by competent experts in the systems engineering field and especially interested in continuing education aspects. As early as 1975, during the sixth IFAC-Congress in Boston, it was recognized that there are needs in the field of continuing engineering education. This resulted in several initiatives. An important step was made in 1978 when a Working Group was established by EDCOM and SECOP to investigate the need for an international educational institute devoted to aspects of systems engineering. The conclusions of this group are now the basis for developing a systems engineering continuing education program. This Workshop can be seen as a stage in this process of meeting the needs of systems engineers in the years to come.

The Workshop was organized around eight main topics:

- Methodological Aspects

- Power Systems
- Systems & Goals
- Computer Aided Analysis and Design; Methods and Tools
- Biological & Fermentation Processes
- Miscellaneous Problems
- Ecological Systems
- Education in Systems and Control.

16 papers were presented in 9 plenary sessions.

At the closing session, which was chaired by G. Honderd (Delft, NL) it was suggested that IFAC should now take the initiative to set up an international program of continuing education courses, especially in the field of systems engineering. The IFAC Council could designate the EDCOM Working Group on Continuing Education to accept responsibility with respect to this goal.

The proceedings of the Workshop are available from

H. Feikema
University of Technology,
Dept. of Applied Physics
Lorentzweg 1
NL 2628 CJ Delft

UNIDO IV

The Fourth General Conference of the United Nations Industrial Development Organisation

Concluding a busy period of intensive preparations — on which IFAC Newsletter informed in its May 84 issue — UNIDO IV was opened according to plan on August 2, 1984 in Vienna. Delegates from 139 countries, among them many Ministers, State Secretaries and Ambassadors, as well as representatives and observers of various international governmental and non-governmental organisations came to the Conference Centre in the Hofburg, the former Imperial Palace, to shape UNIDO's policy in view of new technological advances and developments.

During the inaugural ceremony addresses were delivered by the Secretary-General of the United Nations Mr. Javier Perez de Cuellar and the Federal President of Austria Dr. Rudolf Kirchschläger.

Mr. van Barneveld Kooy (Netherlands) was elected president of the conference.

The Executive Director of UNIDO Dr. Abd-El Rahman Khane presented his own assessment of the situation, describing the constraints on the industrialization efforts of

developing countries. A special issue of the Industrial Development Survey entitled "Industry in a Changing World" underlined the fact that the industrial situation in any country cannot be depicted in isolation from developments in other economic fields.

Although the conference was prolonged for one day beyond the scheduled termination on August 18, with drafting committees working during the night, consensus for the final resolutions was not found. The differences concerned the causes of the limited progress in the industrialization of many developing countries and the claim to mobilize more financial resources for industrial development. Nevertheless the conference can claim to have had substantial positive results, the work in the committees having been very well prepared by the UNIDO Secretariat.

IFAC had been invited to attend UNIDO IV and was represented by Mr. G. Hencsey, Secretary of IFAC and by Dr. O. G. Ladanyi on behalf of DECOM.

In the statement Dr. Ladanyi delivered to the Conference he informed on IFAC's and DECOM's activities and on the related deliberation of the Budapest Congress.



Dr. O. G. Ladanyi at UNIDO IV.

IFAC TC on Mathematics of Control

Complying with the recommendations of the Technical Board
the "Mathematics of Control Committee (MoCC)"

has been structured into five Working Groups with their scopes described below:

Mathematical System Theory

Mathematical system theory encompasses a large field of scientific activities; it includes both linear and nonlinear system theory, both of which can be lumped or distributed. Typical subjects are controllability aspects, feedback decoupling, disturbance rejection, invariances, duality, stability, ... Currently the algebraic and geometric approach to such concepts attracts attention. Generalization of finite dimensional results to infinite dimensions (semi-group approach) are also welcome, as well as more numerical studies related to for instance approximation and algorithms for impulse responses and Riccati equations.

Control Applications of Nonlinear Programming

Will deal mainly with the exchange of ideas between people who (i) apply nonlinear programming techniques to real world problems, and (ii) develop these techniques. Examples of practical applications are: flight mechanics and control; optimal design; control of railway vehicles and automobiles. Examples of nonlinear programming algorithms and software are: robust direct and indirect optimal control techniques; medium to large scale control problems.

Team and Game Theory

Originally game theory and zero-sum differential games were different subjects. During the last decade these fields have merged giving rise to dynamic nonzero-sum game theory which turned out to be quite versatile. Team theory and pursuit-evasion

games are extremes. The role of (partial) observations, the information available, is crucial for decision making. Applications are for instance found in worst case design methodologies and economics. In the latter case the theory of incentives attracts a lot of attention.

Asymptotic Analysis and Singular Perturbations

Asymptotic analysis is used in systems with parameters (e.g. time constants) of different magnitude(s). Theory and applications of singular perturbations are found in systems and control, including linear system theory, stochastic systems, optimal control of linear and nonlinear systems, asymptotic analysis, aerospace applications, aircraft flight dynamics and electric power systems applications. Nonlinear and stochastic problems (with new results and old controversies) will be stressed, such as for instance the undermodeling of adaptive control.

Stochastic Analysis and Control

This working group deals with the more mathematical aspects of stochastic analysis and control including (and arising from) such fields as probability measures on abstract spaces, differential systems driven by noise, filtering and identification, optimal stochastic control, martingale approaches. Applications in which these subjects play an important role, such as for instance (air) traffic control, also belong to this working group.

(Names and addresses of the chairpersons available at the Secretariat.)

During this Congress an informal meeting was held between UNIDO officials and DECOM members discussing additional possibilities for cooperation.

UNIDO is now considering the increase of efficiency in existing industries through the application of microcomputers. As automatic control devices these computers offer many advantages especially for small and medium sized enterprises. The same equipment is used for the decentralised control in large scale plants, in such systems linked however with a central control and data processing unit.

One of the problems still to be solved is that of a convenient personnel education. The future experts in developing countries must become initiative with the assistance of control engineers from developed countries.

It was agreed in Budapest that DECOM in cooperation with other TCs will work out proposals for workshops and "on the job" education programs. Training courses in automatic control laboratories should be tested in industrialised countries with personnel and staff of smaller companies. Generally curricula have to be updated in time and to be modified for the assignment in different developing regions.



World Congress 1984

Proceedings of the 9th IFAC Congress, Budapest, Hungary, 2—6 July 1984

Major areas covered include: Applications, biomedical engineering, components and instruments, computers, developing countries, economic and management systems, education, manufacturing technology, mathematics of control, social effects of automation, space, systems engineering, terminology and standards, theory.

4000 pp approx. To be published in 1985

Control in Power Electronics & Electrical Drives 1983

Proceedings of the 3rd IFAC Symposium, Lausanne, Switzerland, 12—14 Sept. 1983

Edited by R. Zwicky, Zurich, Switzerland

Contains 97 papers which provide a valuable picture of the latest research developments in this rapidly expanding field. Areas of development particularly examined are the emergence of power switching transistors, the application of microprocessors to regulation and control of static converters and

electrical drives, the use of more sophisticated control strategies and the utilization of power electronics in new application fields.

700 pp US \$ 175.00

Safety of Computer Control Systems 1983

Proceedings of the 3rd IFAC Workshop, SAFECOMP '83, Cambridge, UK, 20—22 September 1983

Edited by J. A. Baylis, CERL, Leatherhead, Surrey, UK

Presents and discusses the most recent advances in the achievement of reliable on-line computer systems, in software engineering, in hardware and in management techniques. Major topics covered include safety and reliability assessment, design for safety and reliability, fault tolerance and recovery, and the use of redundancy, specification techniques, system development and OA, verification and validation, scheduling, networks, communications. Of interest to control and electrical engineers and systems scientists in research and industry concerned with the design and operation of safety related computer systems.

300 pp US \$ 58.00



Prof. Song Jian
Member IFAC Council

Prof. Song Jian was born in 1931 in Shandong, China. He is married and has two children. In 1958 and 1960 he graduated and received his degree as Candidate of Science (Ph. D. equivalent) from the Technical Institute, Moscow.

In the sixties he was a research fellow and deputy director of the Control Theory Research Laboratory, Institute of Mathematics at the Chinese Academy of Sciences. In the seventies he served as director of the Research Institute of Systems Engineering, where he led several programs of theoretical research and engineering implementation of industrial control systems. Since 1978 he has also been a professor at the Harbin University of Technology. In 1980 he was appointed director of the Institute of Information and Control in Beijing. As an invited professor he visited Harvard University, Washington University, the St. Louis University and the University of Minnesota.

Professor Song's main research interests have been related to optimal control theory, distributed parameter systems and their various applications to industry and space technology. Since 1978 he has been involved in research of population system control theory and applications which is a burning issue at present for China and other developing countries. His efforts in this field — notably his contributions to population control theory played a major part in China's birth control program.

In 1980 Prof. Song was elected President of China's Association of Automation, and in 1981 Vice President of the Chinese Society of Population Science. Also in 1981 he was appointed to be Vice-Minister of the Ministry of Astronautics of China.

Since 1980 Prof. Song has been actively participating in various IFAC activities, serving on the Program Committees for several IFAC conferences and workshops. He initiated and made considerable efforts to organise the 3rd Workshop on Distributed Computer Control Systems of IFAC, which was successfully held in Beijing in 1981.

The IFAC General Assembly, meeting in Budapest on July 2, 1984, elected Prof. Song Member of the IFAC Council. The "IFAC Family" is looking forward to an intensified cooperation with China.

One of IFAC's 14 Technical Committees

deals with "Social Effects of Automation". Established in 1972 it has been drawing the attention of the control engineering community to the increasing technical and economic importance of human aspects. In addition to the colloquia and round table discussions organised under direct responsibility of SOCEFF during the Budapest Congress, many other lectures, sessions and discussions dealt with this topic. New activities are required and can be expected for the near future.



The newly elected chairperson, Mrs. Lena Martensson (S) is seen here with three of the committee's vice-chairmen, i.e. (left to right) Prof. Ranger Curran (USA), Dr. Tom Martin (FRG) and Prof. Shuhei Aida (Japan). Prof. Howard Rosenbrock (UK), who is also vice-chairman of the Social Effects of Automation Committee was not present in Budapest.

FORTHCOMING EVENTS

Title	1985	Place	Deadlines	Further Information
IFAC/IFORS/IFIP Workshop Artificial Intelligence Pattern Recognition in Economics and Management	March 12—14	Zurich, CH	—	Prof. L. F. Pau Battelle Institute 7, Route de Drize CH-1227 Carouge Switzerland
6th IFAC Workshop Distributed Computer Control Systems	May 20—22	San Francisco, CA, USA	Oct. 31 1984	Dr. G. J. Suski Lawrence Livermore National Laboratory P.O. Box 5508 Livermore, CA 94550, USA
IFIP/IFAC Conference Programming Languages for Machine Tools (PROLAMAT)	June 11—13	Paris, F	—	AFCET 156, Bd. Pereire F-75017 Paris, France
IFAC Workshop Control Application of Nonlinear Programming and Optimization	June 11—14	Capri, I	Nov. 30, 1984	Prof. G. Di Pillo Dipartimento di Informatica e Sistemistica Universita di Roma „La Sapienza“ Via Eudossiana 18 I-00184 Rome, Italy
IFAC Workshop Model Error Concepts and Compensation	June 17—18	Boston, MA, USA	—	Prof. R. E. Skelton Purdue University Aeronautics & Astronautics 331 Grissom Hall West Lafayette, IN 47907, USA
IFAC/ISAGA Workshop Simulation and Games	June 24—26	Alma-Ata, SU	—	Acad. V. A. Trapeznikov Institute of Control Sciences Profsojuznaja 65 Moscow 117342, USSR
IFIP/IFAC Symposium Automation for Safety in Shipping and Offshore Petroleum Operations — ASSOPO '85	June 25—27	Trondheim, N	—	The Norwegian Society of Automatic Control Kronprinsens gt. 17 Oslo 2, Norway
IFAC Symposium Automatic Control in Space	June 25—29	Toulouse, F	—	Prof. M. Pelegrin CERT Complexe Aérospatial de Lespinet 2, Avenue Édouard Belin BP 4025 F-31055 Toulouse Cedex France
7th IFAC/IFORS Symposium Identification and System Parameter Estimation	July 3—7	York, UK	—	Prof. H. A. Barker University College of Swansea Dept. of Electrical and Electronic Engineering Singleton Park Swansea SA2 8PP, UK
IFAC Symposium Automation for Mineral Resource Development	July 9—11	Brisbane, AUS	—	Prof. Alban J. Lynch Julius Kruttschnitt Mineral Research Centre University of Queensland Isles Road, Indooroopilly, QLD 4068 Australia
IFAC Symposium Planning and Operation of Electric Energy Systems	July 22—25	Rio de Janeiro, BR	—	T. E. DyLiacco Consultant 651 Radford Drive Cleveland, OH 44143 USA
3rd IFAC/IFIP Symposium Computer Aided Design in Control and Engineering Systems	July 31— Aug. 2	Copenhagen, DK	—	Prof. P. M. Larsen Electric Power Engineering Building 325 DK 2800 Lyngby, Denmark

FORTHCOMING EVENTS (ctd.)

Title	1985	Place	Deadlines	Further Information
IFAC/IFORS Conference Control Science and Technology for Development	August 20—22	Beijing, PRC	—	Prof. Yan Xiaojun Research Institute of Automation for Machine-Building Industry De Sheng Men Wai Beijing, China
2nd IMACS/IFAC/WGMA Intl. Symposium Systems Analysis and Simulation	Aug. 26—31 1985	Berlin GDR	—	Organizing Committee 2nd Intern. Symposium on Systems Analysis and Simulation Central Institute of Cybernetics and Information Processes of the Academy of Sciences of the GDR P.O.B. 1298 DDR-1086 Berlin
2nd IFAC/IFIP/IFORS/IEA Conference Analysis, Design and Evaluation of Man-Machine Systems	Sept. 10—12	Varese, I	—	Prof. Dr. Ing. Gunnar Johansen Laboratory for Man-Machine Systems (FB 15) University of Kassel (GhK) P.O. Box 10 13 80, D-3500 Kassel, FRG
7th IFAC/IFIP/IMACS Symposium Digital Computer Application to Process Control	Sept. 17—20	Vienna, A	—	Dr. P. Kopacek Ö P W Z Postfach 131 1014 Vienna, Austria
4th IFAC Workshop Safety of Computer Control Systems (SAFECOMP '85)	Oct. 1—3 1985	Como I	Nov. 30, 1984	Dr. E. DeAgostino Senior Research Engineer ENEA — Dip. Reattori Termici, CRE-Casaccia Via Anguillarese 301 I-00060 Rome, Italy
IFAC/IFORS Symposium Systems Analysis Applied Water and Related Land Resources	Oct. 2—4	Lisbon, Portugal	Nov. 15, 1984	Prof. Luis Valadares Tavares APDIO Av. Rovisco Pais 1000 Lisbon, Portugal
IFAC Workshop Adaptive Control in Chemical Processes	Oct. 21—22 1985	Frankfurt FRG	not yet known	H. Wiefels VDI/VDE GMR P.O. Box 1139 D-4000 Düsseldorf 1, FRG
IFAC Symposium Robot Control	Nov. 6—8	Barcelona, E	—	Secretariat of SYROCO '85 Institute de Cibernètica Diagonal, 647 E-080828 Barcelona, Spain
IFAC Workshop Automatic Control in Petroleum, Petrochemical and Desalination Industries	Nov. 18—20 1985	Kuwait	not yet known	Dr. Jaafar Assiri c/o Dr. Samir Kotob TED/ASD Kuwait Institute for Scientific Research P.O. Box 24885, Safat, Kuwait
IFAC Symposium Modelling and Control of Biotechnological Processes	Dec. 11—13	Noordwijker- hout, NL	—	Prof. Dr. A. Johnson Lab. voor Fysische Technologie Prins Bernhardlaan G 2628 BW Delft The Netherlands
Title	1986	Place	Deadlines	Further Information
IFAC Symposium Automatic Control in Chemical Processes	April 21—25	Pretoria, ZA	not yet known	Mr. J. D. N. van Wyk CSIR P.O. Box 395 Pretoria 0001, South Africa
IFAC/IFIP/IFORS/IMACS Symposium Information Control Problems in Manufacturing Technology	April 22—25	Moscow USSR	not yet known	Acad. V. A. Trapeznikov USSR National Committee of Automatic Control Profsojuznaja ul. 65 Moscow GSP 312, USSR