IFAC International Federation of Automatic Control
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1989
No. 2
April

Newsletter

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Welcome to Tallinn

11th IFAC World Congress

13 - 17 August 1990, Tallinn, USSR

Estonia was carried on the political world map once again in 1988. The capital of Estonia - Tallinn - will be on the world map of automatic control for the next two years. The 11th IFAC World Congress will be held in Tallinn from 13 - 17 August, 1990.

The Institute of Cybernetics of the Estonian Academy of Sciences is the host of the Congress in cooperation with the Tallinn Technical University under the guidance of the USSR National Committee of Automatic Control (as IFAC NMO).

The Congress will take place at the Tallinn Congress Centre. Accommodation will be available in several easy-to-reach hotels. You can arrive in Tallinn by boat from Helsinki (recommended) or by air or train via Moscow and Leningrade.

The first known record that mentioning the settlement of ancient Estonians dates back to 1154. A great part of old Tallinn's early medieval architectural monuments have been preserved and it is they which lend the town its singular appearance. It is worth while to come and look at a town breathing the spirit of the East and the West.

Technical Program

The scope of interest of IFAC Congresses is indicated by its Technical Committees and below we give the IFAC '90 Congress subject areas.

The Technical Program will consist of plenary sessions, technical sessions with survey, tutorial and regular papers, discussion sessions and case study sessions.

The aim of the plenary sessions is to give an overview of the state-of-the-art and the future development in some selected fields of IFAC. The other sessions are arranged in subject areas. Each subject area consists of a group of technical sessions, discussion sessions and case study sessions. In the technical sessions survey/tutorial papers (40 minutes) and regular papers (20 minutes) are presented. The goal of the discussion sessions is to discuss selected subjects from all points of view after a short introduction by invited speakers. In some areas tutorials and case studies are presented, which show an in-depth treatment of an automatic control problem including applications.

Special attention will be on application oriented contributions. For this reason industrial companies are kindly asked to present their knowledge and experience.

Call for Papers

Papers are invited in all fields of automatic control, including theory, applications and implementation of automatic control in technical, biological, economic and man-machine systems.

Papers will be reviewed by the Intenational Program Committee which is composed of sub-committees covering each subject area. The Organizing Committee invites you to take part in the work of the Congress.

Subject Area Titles

1.1 Automatic Control in Aerospace
2.1 Control of Electric Generating Plants and Power Systems
2.2 Control in Mineral, Mining and Metal Processing
2.3 Control of Chemical Processes and Processes for Natural Products Like Food, Wood, Agriculture
2.4 Industrial Applications of Modern Control Methods
2.5 Control of Cars, Ships and Engines
2.6 Application of Artificial Intelligence and Expert Systems for Automatic Control
3.1 Biomedical Engineering
4.1 Intelligent Components and Instrument for Automatic Control
4.2 Control of Electrical Drives and Power Electronics
4.3 Control System Elements
5.1 Distributed Computer Control Systems
5.2 Artificial Intelligence in Real-Time Control
5.3 Software Engineering for Real-Time Control
6.1 Control System Approach to Development
7.1 Strategic Planning of Energy Systems
7.2 Modelling, Control and Decision Making in Socio-Economic Systems
7.3 Application of Identification Methods for Efficiency in Long Term Activity and Enterprises
8.1 Automatic Control Education
9.1 Automatic Control in Manufacturing
9.2 Robot Control
10.1 Nonlinear Control
10.2 Control Applications of Optimization
10.3 Distributed Parameter Systems
11.1 Social and Cultural Aspects of Automation
12.1 Large Scale Systems
12.2 Improving International Stability
12.3 Industrial Systems Engineering
12.4 Computer-Aided Control System Analysis and Design
12.5 Man-Machine Systems
12.6 Control of Transportation Systems
12.7 Water Resources and Environmental Systems Planning
14.1 Linear Systems Theory
14.2 Stochastic Control and State Estimation
14.3 Adaptive Control
14.4 Modelling and Identification
14.5 Robust Control
14.6 Theory of Discrete Systems

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IFAC Tallinn '90

Procedure for Paper Submission

The Second Announcement and Call for Papers was sent to all IFAC NMOs in February with the deadline for mailing the Return Card with an attached Abstract by 31 March, 1989.

As it was brought to our attention that it took very long for the Call for Papers to arrive at their respective destinations, the **deadline for receipt of Abstracts together with return cards (return card as printed on the right can be used) has now been extended to 15 May 1989.**

Please mail the Abstract together with return card to

IFAC Secretariat
Schlossplatz 12
A-2361 Laxenburg
Austria

Persons having submitted an Abstract by 15 May 1989 will be provided with special sheets and typing instructions for the Final Paper by 1 June 1989.

Mailing address for the final camera-ready paper (plus 5 copies) is

IFAC '90 Congress Secretariat
Institute of Cybernetics
Akadeemia tee 21
200108 Tallinn
USSR

The deadline for postmark of Final Paper is 15 July 1989

IFAC Congress Paper Prizes

The IFAC Congress Applications Paper Prize and the IFAC Congress Young Author Prize were established by the IFAC Council in 1985. Both prizes will consist of a certificate and a monetary award of sfr 1.500,-- to be split among the authors of winnng papers. Candidates for each prize are nominated by a selection committee appointed by the IFAC Council.

A. The criterion for the Applications Paper Prize for the **IFAC '90 Congress** is the highest technical quality and a good presentation of the results of implementation in the fields of **automation in manufacturing** and/or **application of artificial intelligence technique to real-time control supervision.**

B. The criterion for the Young Author Prize is the highest technical quality and a good presentation of results in the scope of the Congress. The following conditions must be satisfied by all authors for their papers to be considered as candidates for the Young Author Prize

- The author of a candidate paper must be 35 years or younger by 31 December 1989.
- In the IFAC '90 Congress Return Card it should be explicitely stated that the age limitation is satisfied.
- The paper must be presented in person at the IFAC '90 Congress by one or more of the authors.

Social Events and Technical Visits

In addition to the Congress technical program, a number of feature programs are being planned, such as

- technical visits to plants and scientific institutes in the city of Tallinn
- excursions to scenic and historical sites and other places of interest in Tallinn and Estonia
- a reception and other social events in the evenings.

Further information will be provided at your request by

IFAC '90 Congress Secretariat
Institute of Cybernetics
Akadeemia tee 21
200108 Tallinn
USSR
Tel: 527901 U. Jaaksoo (IPC)
525622 A. Work (NOC)
Tx: 173267 ifac su

You are cordially invited to participate actively in the 1990 IFAC Congress in Tallinn.

Tere tulemast Tallinna!

11th World Congress of the
International Federation of
Automatic Control
Aug. 13 - 17, 1990, Tallinn, USSR

RETURN CARD (Please print)

Title.....Surname _____

First name and middle initial _____

Affiliation _____
(co/Org/Univ, etc.)

Street _____

P.O.Box _____

City (and State) _____

Postal Code _____

Country _____

Telephone _____

Telex _____

Telefax _____

☐ I wish to receive further information

☐ I plan to attend the Congress

☐ An Abstract of my paper is enclosed

☐ Young Author Prize limitation satisfied

I suggest sending a Second Announcement to (full name and address)

Date _____

Signature _____

Send Abstract and/or Return Card to

IFAC Secretariat
Schlossplatz 12
A-2361 Laxenburg
Austria

before 15 May 1989

Newly Approved Events

Title	Date	Place	Deadlines	Further Information
IFAC/IFIP Workshop (3rd) Experience with the Management of Software Projects	Oct.30 Nov. 2 1989	Purdue W.Lafayette USA	*	Dr. P. Elzer Zentrales Forschungslabor Brown Boveri & CIE AG Eppelheimer Str. 82 D-6900 Heidelberg 1
IFIP/IFAC Intl. Conference Modelling the Innovation: Communications, Automation & Information Systems	March 21-23 1990	Rome Italy	-	Conference Secretariat c/o Dr. A. Tornambe Fondazione Ugo Bordoni via Baldassarre Castiglione 59 I-00142 Rome, Italy
JSME/IFAC Intl. Conference Manufacturing Systems & Environ- ment Looking Towards the 21st Century	May 29 June 1 1990	Tokyo Japan	July 31 1989	T. Nakajima, The Japan Soc. of Mech.Engineers Sanshin Hokusei Bldg 4-9 Yoyogi 2-chome, Shibuya-ku Tokyo 151, Japan
IFAC Symposium Design Methods of Control Systems	Sept. 4-6 1991	Zurich Switzerland	*	Dr.F.Kraus, ETH Zentrum/ETL CH-8092 Zurich, CH
IFAC/IMACS Symposium Robot Control	Sept. 16-18 1991	Vienna Austria	Nov. 1 1990	Prof. P. Kopacek Systemtechnik-Automatisierg. A-4040 Linz-Auhof, Austria

* not yet known
- past

Spacecraft Autonomy: Present and Future Capabilities

IFAC Workshop

13 - 15 September 1988, Pasadena, CA, USA

This IFAC Workshop, sponsored by the IFAC Technical Committee on Aerospace, was held at the Jet Propulsion Laboratory in Pasadena. 55 participants from ten nations attended the Workshop. It was the third in a series of Workshops which have been held in four-year periods focusing on topics concerning mission control and spacecraft reconfiguration in-flight.

The Workshop was opened with a keynote address by Dr. Peter T. Lyman, Deputy Director of the Jet Propulsion Laboratory. Dr. Lyman discussed the development of autonomous reconfiguration features in the twenty five years of spacecraft development, described the eight key reasons for continued development of spacecraft autonomy, and charged the participants of the Workshop to carry forward the rapid development of autonomous features to serve the complex space projects of the next quarter century. He said: "For those of you who work in the design and management of space projects, you must continue to show your planners the benefits of spacecraft autonomy. Provide, in public forums, a clearer identification, demonstration and articulation of the benefits of spacecraft autonomy, which can help clear the way for improved funding. Because we are at a point where technology, both in hardware and software, is enabling great strides, those of you in research must develop applications of knowledge-based expert systems to support spacecraft ground operations and then provide for its evolution to on-board applications." He also said that this Workshop is the only forum discussing this inevitable evolution of technology.

The Workshop was organized around five topics in spacecraft autonomy which were discussed through the mechanism of twenty-five informal presentations.

The first topic was concerned with Mission Control Related Experience with Spacecraft Autonomy wherein the need to verify the operation of autonomous capabilities in-flight was discussed.

Second, the forecast capabilities of Autonomy in Unmanned Missions of the Future were explored with discussions of ISO, CASSINI, and the NASA/JPL Mars Rover. Topics concerned with the need for autonomy in mission management, in image analysis, in the local navigation of planetary rovers, and in the protection of critical events in unique windows of opportunity were highlighted.

Third, Autonomy in Space Station Related Missions was covered, with the result that these very complex systems require numerous autonomous functions to make their operation manageable.

Fourth, Subsystem Oriented Autonomy Contributions included the uses of fault tolerant computers, of two-channel digital tuned gyros, of redundant sun sensors, and of expert/knowledge-based systems to enhance spacecraft autonomy.

And lastly, a summary of studies on autonomy methodologies pointed toward onboard autonomous mission control concepts highlighting the further need for expert systems, model based reasoning and autonomy validation at the system level. This session ended with a Japanese presentation of very future minded concepts for onboard autonomous system reconfiguration including learning capabilities.

A roundtable discussion, very actively supported by the audience, concluded the Workshop. The amount of ground control needed as function of spacecraft autonomy was debated. It was concluded that the requirements for spacecraft autonomy must be formulated at the highest system level rather than left to be driven by the spacecraft's hardware or as a carryover from previous missions. The participants agreed that in the next five years, application of autonomous control should be tried out in the ground segment before being moved on-board a spacecraft; designers must be modest in their aspirations for the incorporation of on-board autonomy; and expert systems are probably not the magic solution for on-board autonomy. They also agreed that it will be difficult to qualify the extensive autonomy functions desired for the initial operations of the various space stations, and that validation of autonomous functions, regardless of their method of implementation, looms as a difficult task.

G.E. Cunningham, NOC Chairman

automatica

The Journal of IFAC the International Federation of Automatic Control

Papers from the Next Issue - May 1989

Survey Paper

Model Predictive Control: Theory and Practice - A Survey
(C.E. Garcia, D.M. Prett, M. Morari)

Papers

Analysis of Decision Aiding in Submarine Emergency Decisionmaking
(S.T. Weingaertner, A.H. Levis)
Distributed Adaptive Estimation with Probabilistic Data Association
(K.C. Chang, Y. Bar-Shalom)
Robust Stability of Perturbed Systems with Time Delays
(B.R. Barmish, Z. Shi)
Experiment Design in a Bounded-Error Context: Comparison with D-Optimality
(L. Pronzato, E. Walter)
Finite Register Length Issue in the Digital Implementation of Discrete PID Algorithms
(Z. Kowalczuk)

Brief Papers

Ladder-Diagram Design for Programmable Controllers
(D.W. Pessen)
Scheduling Turbofan Engine Control Set Points by Semi-Infinite Optimization
(D.M. Stimler)
Dynamic Decentralized Stabilization for a Class of Multi-Stage Processes
(M.S. Mahmoud)
An Algorithm for Interpolation with Units in H_∞, with Applications to Feedback Stabilization
(P. Dorato, H.B. Park, Y. Li)
LQG Optimal Control System Design Under Plant Perturbation and Noise Uncertainty: A State Space Approach
(B.S. Chen, T.Y. Dong)
Round-Off Error Propagation in Four Generally-Applicable, Recursive, Least-Squares Estimation Schemes
(M.H. Verhaegen)
Inductive Inference Applied to On-Line Transient Stability Assessment of Electric Power Systems
(L. Wehenkel, Th. Van Cutsem, M. Ribbens-Pavella)
Lyapunov Functions of Lur´e Postnikov Form for Structure Preserving Models of Power Systems
(D.J. Hill, C.N. Chong)
Analytic Formulation of the Principle of Increasing Precision with Decreasing Intelligence for Intelligent Machines
(G.N. Saridis)
Fuzzy Controller Theory: Limit Theorems for Linear Fuzzy Control Rules
(J.J. Buckley, H. Ying)

Book Reviews

Optimal Control & Stochastic Estimation, Volumes 1 & 2, by M.J. Grimble and M.A. Johnson
(D. Kraft)
Systems Identification, Theory for User, by Lennart Ljung
(N.K. Sinha)
Identification of Continuous Systems, by H. Unbehauen & G.P. Rao
(P.J. Gawthrop)
Continuous-Time Self-Tuning Control Volume 1 - Design, by P.J. Gawthrop
(Cs. Banyasz)

New Publications

Proceedings of the IFAC/IFIP/IEA/IFORS Conference

Analysis, Design & Evaluation of Man-Machine Systems 1988

Oulu, Finland
14 - 16 June 1988

Editor: J. Ranta
Technical Research Centre of Finland, Espoo, Finland

This volume provides a state-of-the-art review of the development and future use of man-machine systems in all aspects of business and industry. The papers cover such topics as human-computer interaction, system design and the impact of automation in general.

Proceedings of the IFAC Symposium

Automation and Instrumentation for Power Plants

Bangalore, India
15 - 17 December 1986

Editor: M. Ramamoorty
Central Power Research Institute
Bangalore, India

An analysis of power systems, control hardware, modelling and simulation, instrumentation and computers and distributed systems.

For further details and pricing information on the above publications please contact:

Marketing Department
Pergamon Press plc
Headington Hill Hall
Oxford OX3 0BW
UK

Impressum:

Medieninhaber und Herausgeber:
International Federation of Automatic Control (IFAC), Zurich
Schlossplatz 12, A-2361 Laxenburg, Austria

Verlagsort und Redaktion:
Dipl.Ing.Dr. Gusztáv Hencsey
Schlossplatz 12, A-2361 Laxenburg

Hersteller:
Artur Schefczik & Sohn
August-Reuss-Gasse, A-1130 Wien

Editor: Gusztáv Hencsey

Layout: Ernestine Rudas

published bimonthly

WHO IS WHO IN IFAC

Dr. K. H. Well
Chairman of TC on Mathematics of Control

Dr. Klaus Well obtained his Diplom Ingenieur's degree (Masters equivalent) in Mechanical and Aerospace Engineering at the Technical University Braunschweig in 1968. He completed his Ph.D in Aerospace Engineering at Rice University in Houston, Texas in 1972. The subject of his thesis was "Quasilinearization for Optimal Control Problems with Bounded State".
Dr. Well has been with the German Aerospace Research Establishment (DFVLR) since 1972. His present position at the DFVLR is the one of research scientist and head of guidance group at the Institute of Flight Systems Dynamics, Wessling (near Munich) in the FRG.
From 1972-1976 he was involved in the software development for geostationary satellite positioning, station keeping, launcher ascent trajectory selection simulation and optimization of reentry trajectories of space vehicles. From 1977-1981 his task was the investigation of "supermanoeuverability" of future fighter aircraft, thrust vectoring, "post-stall" flight, simulation and optimization of air-combat manoeuvres, generation of new "tactics" for air combat. From 1981 on he has been directing a group of research engineers, all of whom have graduate degrees, and supporting technical staff in research in optimization techniques, differential games, numerical methods with application to design and control of aircraft, missiles and space vehicles. The present applications are (1) development of feedback strategies for manned and unmanned air/combat vehicles and (2) development of advanced (nonlinear) missile guidance laws using new estimation and filtering algorithms. This research is supported by the German Ministry of Defence and partly by the German aerospace industry.
Since 1977 Dr. Well has also been active as a consultant for several industrial organizations in Germany in the areas of numerical techniques for simulation and optimization, operations research and artificial intelligence.
Dr. Well has also had comprehensive teaching experience. Since 1978 he has been lecturer for the Carl Cranz Gesellschaft. The 1978 spring term Dr. Well was Visiting Professor at the University of Texas, Department of Aerospace Engineering and Engineering Mechanics, Austin, Texas. Since 1982, Dr. Well has been lecturer at the Mathematical Institute of the Technical University of Munich. In the spring quarter of 1985, Dr. Well was Visiting Professor at the Aeropsace and Ocean Engineering Department of the Virginia Polytechnic Institute and State University in Blacksburg, Virginia.
In IFAC Prof. Well had been a long-standing member of IFAC's Mathematics of Control Committee when he was elected Chairman of this Committee for the 1987-90 triennium.