IFAC Newsletter
Issue 4, 2001

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IFAC Technical Committees and their Scopes

In our introduction of TCs and their scopes, we present the Coordinating Committee on Systems Engineering and Management

Coordinating Committee on
Systems Engineering and Management

Chair:
I. Craig
South Africa
icraig@postino.up.ac.za

Technical Committee on
Large Scale Systems
Chair:
P. Groumpos
Greece
groumpos@ee.upatras.gr

Promotes dynamics and control of large-scale systems: definition, analysis, development, design, and applications (manufacturing, utilities, communications, agriculture, management, socio-economic, environmental, and transportation systems). Includes modelling, model reduction, decomposition, stability,

decentralised & hierarchical control, optimization, intelligent control, decision support systems, production planning-scheduling, plant wide control-management, computer integrated manufacturing-engineering, distributed and hierarchical computer systems.

Technical Committee on
Human Machine Systems

Chair:
K. Kawai
Japan
kensuke.kawai@toshiba.co.jp

Fosters analysis, design, and evaluation of human-machine systems: manual and supervisory control, decision making and cognitive processes, modelling of human performance (reliability, mental load, predictability), and analysis and modelling of human-machine interaction in real and virtual environments. Human-machine systems: design methodology, task allocation-sharing, job design, intelligent interfaces, human operator support, work organization, and selection and training criteria.

Technical Committee on
Computer Aided Control System Design

Chair:
L. Boullart
Belgium
boullart@autoctrl.rug.ac.be

Fosters all aspects of computer aided design of control systems. Efficient algorithms, robust numerical procedures, and human-computer interfaces to allow ready access to computational tools. Includes CACSD software tools, modelling, and simulation techniques (both symbolic and numerical methods). Special architectures to host various packages, associated databases, and data structures for easy use and manipulation of system data. Addresses discrete event and real-time systems as well as intelligent controllers, non-linear systems, and computer graphical procedures.

Technical Committee on
Business and Management Techniques

Chair:
S. Mittnik
Germany
mittnik@stat-econ.uni-kiel.de

Addresses development and promotion of modelling and problem-solving techniques for economic and financial systems. System engineering methods, identification, signal processing, control & optimization, as well as quantitative methods from economics, econometrics, finance and business. Particular areas of interest include network economics and financial modelling.

Technical Committee on
Modelling and Control of Economic Systems

Chair:
R. Neck
Austria
reinhard.neck@uni-klu.ac.at

Addresses modelling theory and techniques for economic systems, including well established (econometric, general equilibrium models, etc.) as well as more recent approaches (agent-based models, neural networks, models with explicit expectations and learning, etc.). Includes decision and control in economics with one or more decision-makers. Applications to analysis, forecasting, and planning of global, national, regional, and sectoral economies, especially for macroeconomic problems and policies (business cycles, growth, etc.).

**Technical Committee on
SWIIS**

Chair:
F. Kile
USA
102610.2345@compuserv.com

Promotes identification, definition, and improvement of factors that significantly influence international stability, particularly in the multi-polar world following the less-complex bi-polarity of the Cold War. Interacts with national and international organizations to monitor efforts to improve stability and peace. Inform IFAC of ideas and activities to improve stability; show how IFAC can use its unique capabilities for further development of international stability and a more peaceful world.

Barcelona 2002
Invitation to Submit Proposals for
Tutorial Workshops
Open Forum/Panel Discussion

The International Program Committee for the Barcelona World Congress 2002 met in the framework of the IFAC Council- and Related Meetings, this year held in Arlington, VA, USA in conjunction with the American Control Conference.

Luis Basanez, the IPC Co-Chair presented the IPC schedule, the Congress timetable and the list of speakers invited for the Plenary Sessions. The Opening Ceremony of the Congress will take place on Sunday, July 21, 2002.

The following outstanding scientists have been invited to be plenary speakers:

Graham C. Goodwin, Director, Centre for Integrated Dynamics and Control, the University of Newcastle, Australia:
Inverse Problems with Constraints
Katsuhisa Furuta: Professor, Department of Computers and Systems Engineering, Tokyo Denki University, Japan:
Super-Mechano Systems
David G. Luenberger, Professor, Department of Engineering-Economic Systems and Operation Research, Stanford University, CA, USA:
Systems Concepts in Financial Pricing Theory
Hermann Kopetz, Professor, Real-time Systems, Vienna University of Technology, Austria:
Time-triggered Real-time Computing
Alexandre Blasi, Vice-President, Samsung Electronics Iberia, Spain:
Industrial Automation
Sebastián Dormido, Professor, Computer Science Department, National University for Distance Education (UNED), Spain:
The Learning of Control: Present and Future
Judith Orasanu, NASA Ames Research Center, Moffett Field, CA, USA:
Decision Making in Critical Situations

There will also be a number of Tutorials and Panel Discussions.

Individuals or Teams interested in submitting proposals for a Tutorial Workshop to be offered in conjunction with the 2002 IFAC Congress are requested to submit

- Title for proposed Workshop
- Name and affiliation of the Workshop organizer

- List of Workshop presenters (and affiliations)
- Brief (one sentence) Statement of Workshop Go al
- Brief (250-350) Synopsis of Workshop
- Outline of Major Topics to be included
- Workshop length: half-day (3 hours), full day (6 hrs) or two full-day (12 hrs)

These Workshops are intended to be primarily "educational" and, although they include current research and other activities, the major goal is to provide general coverage of selected topics.

- Proposals for Workshops should be sent via e-mail to Professor Agustin Jimenez at ajimenez@etsii.upm.es **no later than October 15, 2001**.
- Acceptances will be notified no later than November 30, 2001.
- The organizer of the Workshop will receive a percentage of the Workshop registration fees.

In the run-up to the 2002 IFAC Congress, Open Forums, i.e. discussions via Internet on specific topics of interest, will be promoted. At the time of the Congress, corresponding to each active open Forum, a Panel Discussion will examine and analyze the material previously discussed via Internet. Panel Discussions without previous Open Forums will also be organized.

Participants interested in submitting proposals for an Open Forum and/or Panel Discussion are requested to submit

- Title for proposed Open Forum/Panel Discussion
- Name and affiliation of the Open Forum/Panel Discussion organizer
- Brief (One Sentence) Statement of the Open Forum/Panel Discussion Goal
- Outline of Major Topics to be included

These Open Forums/Panel Discussion are intended to cover outstanding topics of the three axes, Scientific, Industrial and Social, of the Congress.

- Proposals for Opem Forums/Panel Discussions should be sent via e-mail to Professor Agustin Jimenez at ajimenez@etsii.upm.es **no later than October 15, 2001**.
- Acceptances will be notified no later than November 30, 2001.

Control Engineering Textbook Prize (CETP)
endowed in honor of Harold Chestnut
First President of IFAC

Second Call for Nominations

The *Harold Chestnut Control Engineering Textbook Prize* (CETP) Selection Committee calls for nominations for the Triennial CETP. The Prize goes to author(s) of that control engineering textbook judged to have most contributed to the education of control engineers. The nominated book must be written in one of the official IFAC languages, preferably in English, must have been published between September 1, 1993 and July 31, 1999. The prize, consisting of a monetary award and a certificate, will be pre sented at the closing ceremony of the 15th IFAC World Congress in Barcelona, 2002.
A nomination letter must include the full title, name(s) and address(es) of the author(s), date of publication, name and address of the publisher as well as copies of book reviews (in IFAC affiliated journals and others).

The CETP selection committee asks for and will take into account any additional information to be submitted with the nomination letter such as letters of support, publisher's data, list of adoptions, etc. Any further information will be appreciated.

Please send the nomination material to the EDCOM Chair

Professor Dr. H. Peter Joergl
Institut für Maschinen- und Prozessautomation, TU Wien,
Gusshausstrasse. 27-29,
A-1040 Wien, Austria
joergl@impa.tuwien.ac.at

Your cooperation will be greatly appreciated. Please respond at your earliest convenience.
To be considered, nominations must be received by

September 30, 2001 at the latest.

The winner(s) will be notified in due time so that advance plans can be made to attend the award ceremony.

Control Engineering Practice

Papers from the July 2001 Issue

Fuzzy logic based attitude control of the spacecraft X-38 along a nominal re-entry trajectory
S.-F. Wu, C.J.H. Engelen, Q.-P. Chu, R. Babuka, J.A. Mulder, G. Ortega
Probing control of fed-batch cultivations: analysis and tuning
M. Åkesson, P. Hagander, J.P. Axelsson
Hybrid intelligent control of gas collectors of coke ovens
Chunhua Yang, Min Wu, Deyao Shen, Geert Deconinck
Force control of a robot gripper based on human grasping schemes
Nobuaki Nakazawa, Il-hwan Kim, Hikaru Inooka, Ryojun Ikeura
Extensions of Grafcet to structure behavioural specifications
Hervé Guéguen, Noël Bouteille
Preface to the Special Section on Power Plants and Power Systems Control
H. Weber
Adaptive voltage regulator design for static VAR systems
Giuseppe Fusco, Arturo Losi, Mario Russo
Dynamic coherency identification of generators using self-organising feature maps
Hans-Helmut Wilfert, Knut Voigtländer, Istvan Erlich
Simulator for inter-company operator training
Udo Spanel, Gerhard Krost, Dieter Rumpel
Development of a general intertrip monitoring system for the NGC network
L.R. Clarke, M.E. Bradley, A.O. Ekwue
Black-start-up simulation of a repowered thermoelectric unit
A.Borghetti, G. Migliavacca, C.A. Nucci, S. Spelta
Reality oriented simulation models of power plants for restoration studies
H.W. Weber, F. Prillwitz, M. Hladky, H.-P. Asal
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Introduction to the Special Issue on Advanced Control of Chemical Processes
L.T. Biegler, S.J. Qin
Industrial application of a nonlinear model predictive control to polymerization reactors
H. Seki, M. Ogawa, S. Ooyama, K. Akamatsu, M. Ohshima, W. Yang
A high performance model predictive controller: - application on a polyethylene gas phase reactor
W. Van Brempt, T. Backx, J. Ludlage, P. Van Overschee, B. De Moor, R.Tousain
H"~-Control of a continuous crystallizer
U. Vollmer, J. Raisch
On-line implementation of nonlinear MPC: an experimental case study
L.O. Santos, P.A.F.N.A. Afonso, J.A.A.M. Castro, N.M.C. Oliveira, L.T.Biegler
Data-based construction of feedback-corrected nonlinear prediction model using feedback neural networks
Y. Pan, S.W. Sung, J.H. Lee
A mixed integer optimization approach for simultaneous data reconciliation
and identification of measurement bias
T.A. Soderstrom, D.M. Himmelblau, T.F. Edgar
Sensor validation and process fault diagnosis for FCC units under MPC feedback
T.N. Pranatyasto[1], S.J. Qin
Differential flatness based nonlinear predictive control of fed-batch bioreactors
R. Mahadevan, S.K. Agrawal, F.J. III

An on-line batch span minimization and quality control strategy for batch and semi-batch processes
J. Lee^1, K.S. Lee, J.H. Lee, S. Park
Run-to-run optimization via control of generalized constraints
B. Srinivasan, C.J Primus, D. Bonvin, N.L. Ricker
Modeling and simulation of a SMB chromatographic process designed for enantioseparation
J. Haag, A.V. Wouwer, S. Lehoucq, P. Saucez
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Automatica

Papers from the August 2001 Issue

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Introduction to the special issue on neural network feedback control
(Kumpati S. Narendra, Frank L. Lewis)

Special Issue Papers

Neural network adaptive robust control of nonlinear systems in semi-strict feedback form
(J.Q. Gong, Bin Yao)
Recurrent neural networks for nonlinear output regulation
(Yunong Zhang, Jun Wang)
Disturbance attenuating controller design for strict-feedback systems with structurally unknown dynamics
(Gürdal Arslan, Tamer Basar)
Neural network enhanced output regulation in nonlinear systems
(Jin Wang, Jie Huang)
Adaptive output feedback control of nonlinear systems using neural networks
(Anthony J. Calise, Naira Hovakimyan, Moshe Idan)
Stable adaptive neuro-control design via Lyapunov function derivative estimation
(George A. Rovithakis)
Adaptive-critic based optimal neuro control synthesis for distributed parameter systems
(Radhakant Padhi, S.N. Balakrishnan, Timothy Randolph)
Structured neural networks for constrained model predictive control
(Li-Xin Wang, Feng Wan)
Nonlinear adaptive control using neural networks and multiple models
(Lingji Chen, Kumpati S. Narendra)
On-line identification and adaptive trajectory tracking for nonlinear stochastic continuous time systems using differential neural networks
(Alex S. Poznyak, Lennart Ljung)
Neural net backlash compensation with Hebbian tuning using dynamic inversion
(Rastko R. Selmic, Frank L. Lewis)
Stable hybrid control based on discrete-event automata and receding-horizon neural regulators
(T. Parisini, S. Sacone)
Neuro-controller design for nonlinear fighter aircraft maneuver using fully tuned RBF networks
(Y. Li, N. Sundararajan, P. Saratchandran)

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New Automatica Submission and Review System PAMPUS

Papers

Adaptive Robust Control of MIMO Nonlinear in Semi-strict Feedback Forms

(B. Yao, M. Tomizuka)
A Homotopy Approach to Improving PEM Identification of ARMAX Models
(J. Hu, K. Hirasawa, K. Kumamasu)
Stability Analysis of Pulse-width-modulated Feedback Systems
(L. Hou, A.M. Michel)
A Stabilizing Model-based Predictive Control Algorithm for Nonlinear Systems
(L. Magni, G. De Nicolao, L. Magnani, R. Scattolini)

Brief Papers

Upper and Lower Bounds of the Frequency Response Gain of Sampled-data Systems
(T. Hagiwara, M. Suyama, M. Araki)
Digital Second-order Sliding Mode Control for Uncertain Nonlinear Systems
(G. Bartolini, A. Pisano, E. Usai)
On Terminating Markov Decision Processes with a Risk Averse Objective Function
(S.D. Patek)
Behavior Decompositions and Two-sided Diophantine Equations
(M. Bisiacco, M.E. Valcher)
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(M. Vidyasagar, V.D. Blondel)
Multivariable Anti-windup Controller Synthesis Using Linear Matrix Inequalities
(E.F. Mulder, M.V. Kothare, M. Morari)
A Minimal Polynomial Basis Solution to Residual Generation for Fault Diagnosis in Linear Systems
(E. Frisk, M. Nyberg)
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(Yingmin Jia, J. Ackermann)
Global Decentralized Robust Stabilization for Interconnected Uncertain Nonlinear Systems with Multiple Inputs
(X. Liu, G. Huang)
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(F.A. Cuzzola, A. Ferrante)
Model Reference Control for Timed Event Graphs in Dioids
(B. Cottenceau, L. Hardouin, J,-L. Biomond, J.-L. Ferrier)

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Finite Time Control of Linear Systems Subject to Parametric Uncertainties and Disturbances
(F. Amato, M. Ariola, P. Dorato)
Cheap Decoupled Control
(T. Brinsmead, G.C. Goodwin)
A Magnitude Optimum Multiple Integration Tuning Method for Filtered PID Controller
(D. Vrancic, S. Strmcnik, D. Juricic)
A Remark on Passivity-based and Discontinuous Control of Uncertain Nonlinear Systems
(A. Loria, E. Panteley, H. Nijmeijer)
The Optimality for the Distributed Kalman Filtering Fusion with Feedback
(Yunmin Zhu, Z. You, J. Zhao, K. Zhang, X.R. Li)
Boundedness of Voltages and Currents in Joesphson Junctions Represented by the Perturbed Sine-gordon Equation
(S.M. Shahruz, L.G. Krishna)

Book Reviews

Optimal Flow Control in Manufacturing Sytems: Production Planning and Scheduling, by O. Mamon, E. Khmelnitsky, K. Kogan
(J.R. Perkins)
Large Scale Systems: Modeling, Control and Fuzzy Logic, by M. Jamshidi
(G.J. Vachtsevanos)
Control of Indefinite Nonlinear Dynamic Systems: Induced Internal Feedback, by S.V. Emelyanov, I.A. Burovoi, F.Yu Levada
(A.A. Stoorvogel)

WHO IS WHO IN IFAC
Prof. Ian Craig
member of the Technical Board

Ian Craig was born in Potchefstroom, South Africa in 1961. He obtained the BEng degree in electronic engineering from the University of Pretoria, the SM degree from the Massachusetts Institute of Technology, and the PhD and MBA degrees from the University of the Witwatersrand. He is currently a Professor in the Department of Electrical, Electronic and Computer Engineering at the University of Pretoria (UP). Before joining UP in 1995, he was group leader in the Measurement Control Division of Mintek where he was involved in the design and implementation of advanced controllers for the mineral processing industry.

His research interests include industrial process control as applied to metals and mineral processing, and the economic evaluation of control systems. He has published on the modeling and control of grinding mills, flotation circuits, electric arc furnaces, continuous casters, hot rolling mills and the economic evaluation of such control systems.

Ian is a past president of the South African Council for Automation and Computation, the IFAC NMO in South Africa. He is a member of the IFAC Technical Board as coordinating committee chair for Systems Engineering and Management, and is a member of the TC on Mining, Mineral and Metal Processing, and the TC on Developing Countries. He is editor for control of the Journal of the South African Institute of Electrical Engineers, an associate editor of Control Engineering Practice, and is a member of the IPC of various IFAC events. Recently he was the NOC Chair for the IFAC Conference on Technology Transfer in Developing Countries. He is a registered Professional Engineer in South Africa, and a senior member of the IEEE.