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Newsletter

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International Contacts

**Informal Meeting of the IFAC Officers
Press Conference and Lecture
Vienna, Austria
24 – 27 March, 2000**

**Council and Related Meetings
Panel Discussion
Athens - Patras, Greece
10 – 14 July, 2000**

In addition to holding high-level technical meetings, the Federation is always intent on furthering international contacts. This is partly done in the context of the Annual Informal Meetings in Austria and partly in the framework of the Annual Council- and Related Meetings.

In March this year, the IFAC President, Past President, President Elect, Vice-Presidents and Treasurer will convene for their traditional annual meeting in Laxenburg, at the seat of the IFAC Secretariat. The purpose of this meeting is to hold informal discussions, to meet with the Secretary and the staff of the IFAC Secretariat and to strengthen the links to the Austrian NMO, the Austrian Academy of Sciences and the Austrian Ministry of Science and Research. One other important aspect of this trip to Austria is also one of promoting the Federation. To do this, a press conference, followed by a lecture, given by Prof. Pedro Albertos has been organized. Journalists from all important Austrian newspapers will be invited to the press conference and the lecture.

The lecture has the following title and abstract:

**Control and Society
Pedro Albertos, IFAC President**

The concept of system, as a set of components and their relations and interactions, is a common one in nature, human-made devices and human society. And most systems

can be considered as composed of subsystems, one of them being the control subsystem. In this lecture, this idea, its implications and the role of IFAC in providing a framework for its better use and understanding are analyzed.

First, the controlled behavior of natural systems is emphasized, pointing out what is being learned from them to develop automatic control systems in different fields of application. Then, the relevance of the control subsystem in many important industrial developments is also discussed. In human activities, control and regulating systems also play a crucial role. Some illustrative examples will serve as a reference for further discussion.

Finally, a summary of topics related with control theory and technology is reviewed and the technical structure of IFAC to cope with most of them is outlined.

In the summer period and preceding the Council- and Related Meetings, which will be held in the framework of the IFAC Conference on Manufacture, Modelling, Management and Control – MIM 2000 (Patras, Greece, 12 – 14 July, 2000), members of the IFAC Council and of the Technical Board will participate in a panel discussion which has been organized in Athens on July 10, 2000 by our Greek NMO, the Technical Chamber of Greece. This will provide an opportunity to present IFAC and to learn about developments and the situation of automatic control in Greece.

European Control Conference ECC'99

in cooperation with IFAC

Karlsruhe, Germany

Aug. 31 – Sept. 3, 1999

The European Control Conference 1999 ECC'99, which was held at the Congress Centre in Karlsruhe, Germany, from August 31 to September 3, 1999, reached an all-time high in its 8 years of history. The European Control Conferences are organised every two years under the auspices of the European Union Control Association (EUCA) in cooperation with IFAC and in collaboration with the IEEE Control Systems Society. Corresponding to EUCA statutes the ECC takes place in turn in a different country of the EU. The first such event in Grenoble (1991) was followed by Groningen (1993), Rome (1995) and Brussels (1997), each of them hosting 700-800 participants. The remarkable reputation of the ECC has gained over the years in the international systems and control society is best reflected in the overwhelming number of nearly 1100 delegates from 53 countries that participated this year in Karlsruhe.

The organisers of the ECC'99 emphasised the practical relevance of control theory and technology and stimulated industrial presence by providing sector-oriented Industry Packages. The success of this approach was proven by over 80 contributions from industry which were discussed, taking into consideration cost/profit aspects.

The accentuation of more industry relevant topics could also be observed in the nine plenary and semi-plenary lectures, half of which were dealing with practical applications and which are published in the book "Advances in Control – Highlights of the ECC'99" (Springer Verlag) together with three minicourses held at the conference.

In addition to the traditional concentration of the scientific programme on the field of linear and non-linear control theory, participants of the ECC'99 could, for the first time, recognise a strong activity in the area of process supervision, fault diagnosis and fault tolerant control including aspects of safety, reliability, quality and environmental protection. Based on the number of contributions and participants in sessions, this topic ranked third behind linear and nonlinear systems.

The so far positive response from participants from academia and industry gives credit to the international programme committee and the national organising committee, including the conference organisers VDI/VDE-GMA, the local organisers in Karlsruhe and the general chairman, Prof. P. M. Frank, for good work in preparing and running the conference.

Conference proceedings on CD-ROM and the above mentioned book of surveys and minicourses are still available through the VDI/VDE-GMA (gma@vdi.de) and local booksellers, respectively.

DI Dieter Westerkamp

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Information Technology in Agriculture, Food and the Environment

EFITA/CIGR/IFAC Conference

Bonn, Germany, September 27–30, 1999

The conference had a dual focus: It aimed at (1) the identification of potentials of the new developments in information and communication technology for the development of the agri-food sector and its related environment and at (2) the demonstration and discussion of information and communication systems which utilized the potential for sustainable improvements of the sector's economic and non-economic situation.

The more than 140 papers discussed a wide variety of issues and were presented by scientists from diverse backgrounds. This demonstrated the integrative aspect of information and communication systems which eliminate barriers between traditionally separated areas of scientific research. The conference grouped the presentations in working groups and in conference symposia which aimed at the presentation of system applications with potential interest for certain target groups outside the scientific area.

Examples of conference symposia focused on

- (1) extension services,
- (2) international development,
- (3) policy support,
- (4) precision agriculture, and
- (5) supply chain management.

It became evident during the conference, that there are many efforts to link information systems within enterprises, within supply chains, within sectors, etc. with one exception: policy information and support systems are still quite separated from business and market oriented systems. The interrelationships between policy information systems and business level systems will require more attention in the future.

The conference had an international participation with participants from all continents. It aimed at bringing together representatives of the major associations with engagement in the organization of IT conferences related to agriculture, food and the environment. This included the European, Asian, Japanese and Brazilian Associations for IT in Agriculture, the organizers of the international computer conferences backed by the American Association of Agricultural Engineers and by a group of European farmers' organizations, and representatives of CIGR, the International Commission for Agricultural Engineers. Agreements on future cooperation in international conference activities and in electronic publishing are under discussion.

Further information on the European Federation can be found in www.efita.org. Abstracts of conference presentations are accessible through www.dainet.de/efita99.

Proceedings of the conference can be ordered through schiefer@uni-bonn.de.

Prof. Dr. Gerhard Schiefer
Chairman Program and Organization Committee

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Multi-Agent-Systems in Production – MAS'99

IFAC Workshop

Vienna, Austria, December 2 – 4, 1999

Manufacturing and production have changed dramatically over the last years. One of the future possibilities to reduce production costs are Multi-Agent Systems (MAS). Such systems are one of the key technologies for realization of decentralized, adaptive and complex production systems. A MAS consists of several "agents" working towards a common goal, having different specialisations for specific subtasks.

The IFAC Workshop on "Multi-Agent-Systems in Production MAS'99" was held in Vienna, Austria from December 2 – 4, 1999. The first event on this topic was organized by the Institute for Handling Devices and Robotics (Vienna University of Technology) and should bring together industrialists and scientists of all fields involved in research and development. The workshop was sponsored by the International Federation of Automatic Control (IFAC) as well as the IFAC TC on "Advanced Manufacturing Technology" (MIT). Four other IFAC TCs, IFIP, IFORS, the City of Vienna, the Vienna University of Technology as well as other local companies supported MAS'99 as co-sponsors.

Topics of this workshop included design, self configuration, task distribution, learning, cooperation, fault tolerance, control, path and task planning, coordination, education, scalability, social aspects, organizational design, decision making, programming and languages, interaction (agent – agent, human – agent), automated negotiation, and others. The technical program was especially focused on the application areas robotics, manufacturing, assembly and disassembly.

The workshop was attended by 45 participants from 17 different countries. Resulting from the "Call for Papers", 52 regular papers were selected for the technical program. 40 regular papers (grouped into 13 sessions) as well as 2 survey papers were finally presented during the workshop.

The conference was very well organized in a family-style atmosphere which stimulated intensive and successful discussions. The many positive comments made by the participants of this workshop confirms its success in meeting its objectives.

Vienna, December 1999

G. Kronreif
NOC - Chairman

P. Kopacek
IPC - Chairman

Offenlegung:

Das Medienwerk "IFAC Newsletter" wird als Organ der International Federation of Automatic Control (IFAC) verlegt und ist Eigentum dieser Internationalen Föderation, deren Tätigkeit der Förderung von Wissenschaft und Technik automatischer Regelung und Steuerung dient. Die Föderation hat ihren Sitz in Zürich und ist nach Schweizer Recht als gemeinnütziger Verein angemeldet. Sie verfolgt weder wirtschaftliche noch praktische Ziele. Das Sekretariat der IFAC befindet sich seit 1978 aufgrund eines Übereinkommens mit der Österreichischen Bundesregierung mit der Österreichischen Akademie der Wissenschaften in Laxenburg. Der "IFAC Newsletter" erscheint sechsmal jährlich in englischer Sprache unter der Redaktion des Generalsekretärs der IFAC, Dipl.-Ing. Dr. Gusztáv Hencsey. Die Zeitschrift dient der Information über die Aktivitäten der IFAC. Sie wird kostenlos an Abonnenten in 50 Länder versandt. Die Kosten werden von der IFAC aus Beiträgen der derzeit 49 Mitgliedsländer getragen. Präsident der IFAC für 1999/2002 ist Prof. Pedro Albertos (Spanien), Vizepräsidenten sind Prof. Rolf Isermann (Deutschland) und Prof. Wook Hyun Kwon (Korea). Alle Funktionen werden ehrenamtlich ausgeübt.

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

Prof. Song Jian, China, P.R. Keynote Speaker at IFAC World Congress

In the last issue of the IFAC Newsletter, we had the opportunity to publish the keynote lecture given by Prof. Song- Control and Automation Beyond the Century. The interest of our readers in this subject was enormous and many questions were asked about the person of Professor Song. For this purpose we would like to use this opportunity to introduce Professor Song to our readers.



Prof. Song is a distinguished researcher, educator, and public administrator. He is a former State Councillor (vice premier level) of the People's Republic of China and now newly elected Vice Chairman of China's People's Political Consultative Conference, a high-level advisory body. Just prior to his appointment as Vice Chairman, he held the posts of State Councillor, Chairman of the State Council's Environmental Protection Commission, and Chairman or Minister of the State Science and Technology Commission.

Over the last four decades, he has made significant contributions to a diverse array of disciplines including optimal control and parameter control systems, engineering cybernetics, and population control theory. He supervised the program design of China's anti-ballistic missile systems and the launching and positioning of the country's telecommunication satellites. He initiated and successfully carried out the „Sparks Program”, which aimed at alleviating rural poverty and developing rural/township enterprises throughout China. He has also guided the „Torch Program”, which has spearheaded the development of high-tech industries through the establishment of some 53 science parks in key metropolitan areas across China.

Fluent in English and Russian, Dr. Song has engineering (1958) and PhD candidate of science (1960) degrees from MBTY, Moscow, and a doctor of Science degree (1990) from the Moscow National Technical University.

Dr. Song is also currently an academician of both the Chinese Academy of Sciences and the Chinese Academy of Engineering; professor, Tsinghua University, Fudan University, and Harbin University of Technology; research professor, Institute of Information and Control; council member, China Association of Automation and China System Engineering Society; Doctor of Humane Letters, University of Houston; chief editor, Automatic Control and System Engineering and member of the Editorial Board, Encyclopedia of China.

He previously held posts including, head, Laboratory of Cybernetics, Institute of Mathematics, Academia Sinica (1960-70); designer-scientist

and vice chief designer-scientist (1960-80), head, Space Science Division (1971-78), and vice president (1978-81), Academy of Space Technology, Seventh Ministry of Machine-Building Industry; vice minister and chief commander of Communication Satellite Launching Operations, Ministry of Astronauts (1980-84); and vice president, China Society of Demographic Science (1982-86) and China System Engineering Society (1985-87).

Dr. Song's international experience includes time spent as a visiting professor at MIT, Harvard University, University of Minnesota, University of Texas, Washington University (St. Louis) in the United States and as a foreign member of the Russian Academy of Sciences and the Royal Swedish Academy of Engineering Sciences.

He has authored, co-authored or edited 11 books and has written and published 160 scientific articles. He has received numerous awards, including the Albert Einstein Award (1987), which is the highest recognition of the International Association of Mathematical Modelling, for signal accomplishment in science.

Robotics and Automation in Construction

IAARC/IFAC/IEEE Symposium Madrid, Spain, 22 - 24 Sept., 1999

The ISARC'99 is the sixteenth of the IAARC-sponsored meetings in the field of Automation and Robotization in Construction and follows the ISARC symposia held in Tokyo (Japan) in 1996, in Pittsburgh (USA) in 1997, and in Munich (Germany) in 1998. As in past symposia, ISARC'99 has brought together the world's leading researchers, developers and end-users. The aim of this year's symposium was to present and discuss the synergy of all the driving forces involved in the automation and robotics in construction: "From architect's desk to site robot".

The International Program Committee (IPC) has tried hard to involve scientists related with the Automation and Robotization in Construction from a variety of fields: Civil Engineers and Architects, Electrical and Mechanical Engineers, Computer Science and Economists, etc. The fruit of this effort was the co-sponsorship by two important international scientific organizations, IFAC and IEEE, for the first time in the life of the ISARC. At the same time several Spanish institutions from different sectors have shown great interest and were actively involved in the event.

The International Program Committee is pleased to have received a very huge response from the international community. 133 papers were received from 37 countries and 113 from 32 countries were accepted and presented during the Symposium. Each of the three symposium days started with a Plenary Session with an international outstanding speaker, discussing the different world regions' state-of-the-art in Construction Automation: Japan, USA and European Union. Following the Plenary Sessions, three parallel tracks took place, consisting of three oral sessions: morning, midday and afternoon.

The symposium provided a large number of organizations and private companies with the opportunity to present and exchange their latest research and development activities. About 40% of participants were from industry. The symposium was supported by some public and private Spanish agencies. Three special issues on the subject of ISARC'99 will be published in the international journals in the field of robotics and construction.

Prof. C. Balaguer
IPC Chairman



Control Engineering Practice

A Journal of IFAC the International
Federation of Automatic Control

Papers from the December 1999 Issue

Monitoring of Flexible Production Systems Using High-level Petri Net Specifications (K. Feldmann, A.W. Colombo)
Asynchronous Measurement and Control: A Case Study on Motor Synchronization (W.P.M.H. Heemals, R.J.A. Gorter, A. van Zijl, P.P.J. van den Bosch, S. Weiland, W.H.A. Hendrix, M.R. Vonder)
A Practical Control Strategy for Servo-pneumatic Actuator Systems (J. Wang, J. Pu, P. Moore)
Identification of the Rainfall-runoff Relationship in Urban Drainage Networks (F. Previdi, M. Lovera, S. Mambretti)
Automatic Detection of Sluggish Control Loops (T. Häggglund)

Special Section on Real-time Programming
Preface on the Special Section on Real-time Programming (W.A. Halang, A.H. Frigari, L. Zhang)
Scheduling Hard and Soft Real-time Communication in a Controller Area Network (M.A. Livani, J. Kaiser, W. Jia)
Efficient Adaptive Connection Admission Control Algorithms for Real-time ATM LANs (W. Zhao, W. Jia)
Performance Evaluation of a Multithreaded RTS Using a Synchronous Reactive Model (A. Valderruten, V.M. Gulias, J. Mosquera, J.S. Jorge)

IFAC Meeting Papers - Keyword Listing
Linear Time Delay Systems, Grenoble, France, July 1998

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Papers from the January 2000 Issue

Editorial (G. Irwin)
Adaptive RBFNN Versus Conventional Self-tuning: Comparison of Two Parametric Model Approaches for Nonlinear Control (C. Pereira, J. Henriques, A. Dourado)
Statistical Process Control Based Fault Detection of CHP Units (M. Thomson, P.M. Twigg, B.A. Majeed, N. Ruck)
Guidance and Control of a Reconfigurable Unmanned Underwater Vehicle (M. Caccia, G. Veruggio)
Verifying Digital Filter Error Analysis using DFT Techniques (M.A. Oliver, W. Forsythe)
Modular Neural Network Modelling for Long-range Prediction of an Evaporator (N.T. Russell, H.H.C. Bakker, R.I. Chaplin)

Special Section on Information Control in Manufacturing

Preface on the Special Section on Information Control in Manufacturing (G. Morel)
Assembly Line -Sequencing based on Petri-net T-Invariants (G. Frey)
Experiences of Using Formal Methods for Chemical Process Control Specification (K. Lano, J. Bicarregui, P. Kan)
Languages and Applications in Hybrid Modelling and Simulation: Positioning of Chi (D.A. van Beek, J.E. Rooda)

IFAC Meeting Papers - Keyword Listing
Control Applications and Ergonomics, Athens, Greece, June 1998

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Papers

- Robustly Stabilizing Controllers for Dissipative Infinite-dimensional Systems with Collocated Actuators and Sensors
(J.C. Oostveen, R.F. Curtain)
- Dynamical Analysis of Distributed Parameter Tubular Reactors
(J.J. Winkin, D. Dochain, P. Ligarius)
- Drum-boiler Dynamics
(K. Aström, R.D. Bell)
- A Covariance Extension Approach to Identification of Time Series
(J. Mari, A. Dahlén, A. Lindquist)

Brief Papers

- State Estimation of Continuous Time Radial Basis Function Networks
(S. Elanayar V.T., Y.C. Shin)
- A Fixed order Optimal Control Model of Human Operator Response
(D.B. Doman, M.R. Anderson)
- Estimating the Domain of Attraction for Power Systems via a Group of Damping-reflected Energy Functions
(Young-Hyun Mood, Byoung-Kon Choi, Tae-Hoon Roh)
- Guidance and Control of a Launch Vehicle Using a Stochastic Gradient Projection Method
(F. Madeira, A. Rios-Neto)
- Nonlinear Filters for the Generation of Smooth Trajectories
(R. Zanasi, C. Guarino Lo Bianco, A. Tonielli)
- A Fast Algorithm for the Computation of an Upper Bound on the μ -norm
(C.T. Lawrence, A.L. Tits, P. van Dooren)
- Nonlinear Control for a Convoy-like Vehicle
(C. Canudas-De-Wit, A.D. Ndouli-Likoho)
- Min-max Predictive Control Techniques for a Linear State-space System with a Bounded Set of Input Matrices
(J.H. Lee, B.L. Cooley)

Technical Communique

- Stabilizability Consideration and Design of Rational Controllers for a Class of Time-delay Systems
(L. Naimark, J. Kogan, E. Zeheb)

Book Review

- Control Problems in Industry, by Irene Lasiecka and Blaise Morton
(G. Olsson)

Papers

- A Stable One-step-ahead Predictive Control of Non-linear Systems
(C. Kambhampati, J.D. Mason, K. Warwick)
- Analysis of the Asymptotic Properties of the MOESP Type of the Subspace Algorithms
(D. Bauer, M. Jansson)
- Robust Variance Control for Systems with Finite-signal-to-noise Uncertainty
(Jianbo Lu, R.E. Skelton)
- Quasi -min -max MPC Algorithms for LPV Systems
(Y. Lu, Y. Arkun)
- Sliding Mode Observers for Fault Detection and Isolation
(C. Edwards, S.K. Spurgeon, R.J. Patton)

Brief Papers

- Robust State-predictive Control with Separation Property: A Reduced-state Design for Control Systems with Non-equal Time Delays
(B. Marinescu, H. Bourlès)
- Constrained Robust Predictive Controller for Uncertain Processes Modeled by Orthonormal Series Functions
(G.H.C. Oliveira, W.C. Amaral, G. Favier, G.A. Dumont)
- On Absolute Stability Analysis by Polyhedral Lyapunov Functions
(A. Polanski)
- Multiplier Based Robust H(infinity) Design with Time-varying Uncertainties
(A. Sideris, A. Tchernychev)
- Exponential Stabilization of an Overhead Crane with Flexible Cable via a Backstepping Approach
(B.D'Andréa-Novel, J.M. Coron)
- Stability of Extremum Seeking Feedback for General Nonlinear Dynamic Systems
(M. Krstic, Hsin-H. Wang)
- Q domain Optimization Method for L-Optimal Controllers
(H. Yoon, B.H. Tongue, A.K. Packard)

Technical Communiques

- Output Feedback Stabilizing Controller for Time-delay Systems
(J. Leyva-Ramos, A.E. Pearson)
- Estimating the Degree of Time-variance in a Parametric Model
(M. Waller, H. Saxén)
- Robust H(infinite) Control of Discrete Systems with Uncertain Parameters and Unknown Delays
(M.S. Mahmoud)

Book Reviews

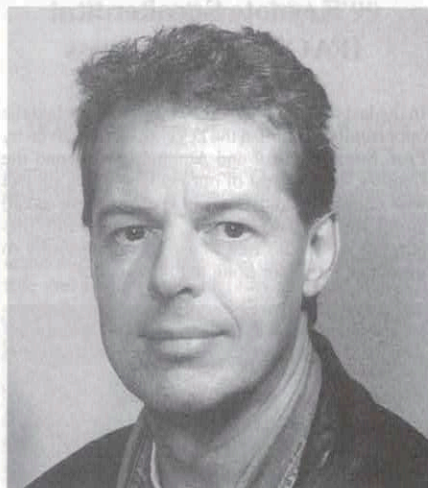
- Nonlinear Dynamical Systems, by P.A. Cook
(S. Battilotti)
- Dynamic Programming and Optimal Control Part I, by D.P. Bertsekas
(T. Glad)
- Smart Material Structure, by H.T. Banks, R.C. Smith, Y Wang
(H. Zwart)

Automatica Special Issue on Neural Networks for Feedback Control Call for Papers

The past decade has witnessed a growing body of experimental work suggesting that artificial neural networks can result in improved performance in complex feedback control problems. This is borne out both in simulation studies, as well as actual implementations of neural controllers in industrial systems. More recently, theoretical studies of neural network based control have begun to appear in the literature, and proofs of stability and convergence of algorithms have also been reported. Since it is already well established that neural networks are very adept at solving pattern recognition problems, as well as at providing approximate solutions to complex optimization problems, they appear particularly suited for improving performance in complex nonlinear systems in the presence of large uncertainties. Since neural networks are merely conveniently parametrized and easily implementable families of nonlinear maps, neural network-based control is a natural extension of adaptive control theory to the nonlinear domain.

In spite of notable advances in the field, the results on neural network feedback control are not generally known widely. In view of this the time is appropriate to bring together the works of researchers doing analytic work in the field, and to expose not only those working in neural networks but also the wider Systems and Control Community to these developments.

WHO IS WHO IN IFAC



Prof. Paul Van den Hof
IFAC Council Member

Paul Van den Hof was born in 1957 in Maastricht, The Netherlands. He received the M.Sc. and Ph.D. degrees both from the Department of Electrical Engineering, Eindhoven University of Technology, The Netherlands in 1982 and 1989, respectively. From 1986 to 1999 he was an assistant and associate professor in the Mechanical Engineering Systems and Control Group of Delft University of Technology, The Netherlands. In 1992 he held a short term visiting position at the Centre for Industrial Control Science, The University of Newcastle, NSW, Australia. Since 1999 he has been a full professor in the Signals, Systems and Control Group of the Department of Applied Physics at Delft University of Technology.

Paul Van den Hof's research interests are in issues of system identification, parametrization and the interplay between identification and (robust) control design, with applications in mechanical servo systems and industrial process control systems. Particular research topics include the development of methods for control-relevant and closed-loop identification. On this latter subject a (public domain) Matlab toolbox has been produced. He has also contributed to the development of flexible parametrizations for linear dynamical systems in the form of generalized orthogonal basis functions.

From 1992 to 1998 Paul Van den Hof was Associate Editor of Automatica, and since January 1999 he has been the Automatica Editor for Rapid Publications. In July 1999 he was elected to the IFAC Council. He is also the prospective Co-Chair of the IPC and NOC of the 2003 IFAC Symposium on System Identification, to be held in The Netherlands.

Therefore, Automatica is soliciting papers for a Special Issue on "Neural Networks for Feedback Control" to be published in July 2001. Accepted papers will present approaches to the design of neurocontrollers that are mathematically precisely formulated with repeatable design algorithms. The Editors will be

Prof. K.S. Narendra (Invited Editor)
E-mail: kumpati.narendra@yale.edu

Prof. F.L. Lewis (Corresponding Editor)
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Manuscripts should be submitted for review to Prof. F.L. Lewis, either by postal mail or electronically, by the

Manuscript Due Date: 1 July 2000

For instructions on submissions by post or electronic mail see the Information for Contributors in each Automatica issue or at
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