

# IFAC Newsletter

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## IFAC Technical Committees and their Scopes

In the last two issues we presented the Coordinating Committees on Manufacturing and Instrumentation and on Systems and Signals. In this issue we continue the presentation with the Coordinating Committee on Transportation and Vehicles.

### Coordinating Committee on Transportation and Vehicles



Chair: U. Kiencke, Germany  
[kiencke@iit.etec.uni-karlsruhe.de](mailto:kiencke@iit.etec.uni-karlsruhe.de)

### Technical Committee on Aerospace



Chair: J. Mitchell, USA  
[mitchell@bobcat.ent.ohiou.edu](mailto:mitchell@bobcat.ent.ohiou.edu)

Deals with every aspect of dynamics, control, and mission control of aeronautical and space related systems including missiles, launch & re-entry vehicles, aircraft, satellites, space stations, helicopters, and autonomous aerospace systems. Addresses conceptual definition, design, simulation, testing, verification, operations and post-operational analysis. Also includes systems in vehicles (e.g. pointing systems and manipulators); man-in-the-loop systems; guidance, navigation & vehicle control; mission control and operations.

### Technical Committee on Automotive Control



**Chair: G. Rizzoni, USA**  
[rizzoni.1@osu.edu](mailto:rizzoni.1@osu.edu)

Promotes modelling of, signal processing in, and control of automobile powertrains, vehicle dynamic systems, and electric & alternative drive vehicles. Includes intelligent vehicle highway systems, integrated traffic management, general automobile-highway strategies, and distributed discrete-event systems. Also addresses automotive sensors, in-vehicle communication networks, human-machine interfaces, and information displays/systems and engines

#### **Technical Committee on Marine Systems**



**Chair: G.N. Roberts, UK**  
[g.roberts@newport.ac.uk](mailto:g.roberts@newport.ac.uk)

Focuses on theory and applications of automatic control within the maritime field. Includes surface vessels, floating structures, sub-marine vehicles, autonomous ocean vehicles, and other devices within the marine environment. Techniques considered include navigation, guidance & control, monitoring & surveillance, optimization, planning, modelling, identification, and safety. Interests span total vessel control to computer systems for marine applications and detailed control of ancillary and auxiliary subsystems.

#### **Technical Committee on Air Traffic Control Automation**



**Chair: R. Genser, Austria**  
[rgenser@aon.at](mailto:rgenser@aon.at)

Addresses holistic approaches and global harmonisation aspects for automatic air traffic control and air management systems. Considers dependability, economy, and efficiency of the whole life cycle with attention toward achieving application oriented specifications, use of real life oriented modelling, optimization, decision support and handling of soft/fuzzy information as well as promotion of harmonised standards and certification processes for control and automation in safety related systems.

#### **Technical Committee on Transportation Systems**



**Chair: M. Papageorgiou, Greece**  
[markos@dssl.tuc.gr](mailto:markos@dssl.tuc.gr)

Develops ground transportation systems (road and guided transport) for both passengers and transported goods. Addresses modelling, simulation, surveillance, automatic control, optimization, real-time operations, information processing, and decision support. Includes common aspects and generic techniques in all transportation modes (road, rail, air, maritime, and intermodal) including system engineering, human-machine interface, human factors, navigation, logistics, safety, simulation, surveillance, control, and intelligent transportation systems (ITS).

#### **Technical Committee on Intelligent Autonomous Vehicles**



**Chair: M. Salichs, Spain**  
[salichs@ing.uc3m.es](mailto:salichs@ing.uc3m.es)

Develops and promotes generic system methodologies and technologies applicable to intelligent autonomous vehicles. Includes mobile robots on land, at sea, or in space. Addresses sensing and perception, architectures, planning, motion control, navigation techniques, teleoperation, and practical applications. Includes vehicle control as well as auxiliary system support.

## News from IFAC

### In-between Council meetings

IFAC is now mid-way between the last Council meeting in Patras, Greece (July 2000) and the next Council meeting in Arlington, Virginia, USA (June 29, 2001). This next Council meeting will take place in conjunction with the American Control Conference in Arlington, which will be held from 25 – 27 June, 2001. IFAC Council- and Related Meetings are always held in an NMO country, upon invitation of that NMO. This provides an opportunity for IFAC Officials to meet both NMO representatives and/or scientists from the inviting country. IFAC is also mid-way between Congresses, the last one having taken place in Beijing, China, July 1999, the next one coming up in Barcelona, Spain, July 2002.

Many decisions were taken at the last Council meeting, but many tasks were also set to be done in the period leading up to the next Council meeting in Arlington.

### Amendment to the IFAC Constitution

Already in preparation for the Council meeting in Patras, discussions had gone on, considering a shortening of the lead time for the application to host IFAC Congresses from twelve to nine years. IFAC is exemplary in requiring future Presidents to serve a long time in preparing for this office and for the Congress at the end of their Presidency. But it was the Council's view that nine years lead-time, plus the requirement of the future President to be active in IFAC in clearly defined positions will be sufficient to know how IFAC works in all aspects – technically as well as administratively. A change of this nature must be reflected in the IFAC Constitution. The Council thus prepared an amendment to the Constitution which was then submitted to the IFAC National Member Organizations for a ballot. The President clearly described the ideas, thoughts and considerations behind the proposed amendment, which led to a comprehensive exchange between NMOs and the Council and then to an almost unanimous vote in favour of the amendment to the Constitution. The new passage in the Constitution now reads as follows:

#### Article 17 (b)

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Only those who have been elected or appointed for at least a total of two terms in one or several of the following offices

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- Council member

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- Technical Board member

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- Technical Committee chair

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- Executive Board member

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- Executive Committee member

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may be elected to the offices of President and President Elect. Normally the President Elect, after serving this capacity for one term, will be elected to the office of President for the next term.

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### Milestone 02 Project

At the Technical Board meeting in Patras, the Milestone 02 Project was introduced and discussed. The intention of this Project is to ask IFAC Technical Committees to provide material for a report to be prepared by every Coordinating Committee. This report is intended to focus on technology and should include answers to the following questions:

- What are the most important aspects of your technology?
- What are the most promising applications in your technology?
- What are the key control concepts in your technology?
- What are the key challenges for your technology?
- What are new areas, new applications, new problems?
- Will your technology become less important? Why?
- etc.

The resulting papers will be discussed at the next Technical Board Meeting in Arlington to make the appropriate refinements for the final version of the reports. The IFAC Barcelona 02 will then be published in a special edition volume generated for the Barcelona 02 World Congress. This volume will include texts from each of the Congress Plenary Presentations and the Milestone Reports from the Coordinating Committees.

## **Industrial Achievement Award**

The idea for this new award was introduced at the Council meeting in Patras. Creation of this award was approved and it will first be presented at the Barcelona World Congress. For more details, please read the article on this page.

## **Informal Meeting of the IFAC Officers**

This meeting will again be held in March. It primarily serves the purpose of being a platform for an informal exchange of ideas among the President, the President Elect, the Vice-Presidents, the Past President, and the Treasurer. This meeting is purposely held at the IFAC Secretariat in Laxenburg, Austria, to allow meeting the Secretary and the Secretariat staff as well as representatives of the Austrian authorities, which have provided a home for the Secretariat for over twenty years. The time in Vienna is also used for technical visits and/or lectures, given by one of the IFAC Officers. Last year's lecture by Professor Albertos on Control and Society will this year be followed by a lecture given by Professor Isermann, with the title: Mechatronic Systems – Integrated Systems with Automatic Control.

## **New IFAC Homepage**

The period following the Council- and Related Meeting in Patras was also characterized by the development of the new IFAC homepage. Professor Alfons Crespo from the Polytechnical University of Valencia developed the new homepage with the assistance of his team at the university and the input from the IFAC Secretariat. As is usual in such tasks, activities turned very hectic towards the end of the year, immediately preceding the time when the new homepage went online. Now the new IFAC Homepage is there for all of you to use. We would be interested in your reactions to the new design, the links and contents. You can send such information and your comments directly to the IFAC Secretariat at [secre@ifac.co.at](mailto:secre@ifac.co.at).

Our thanks go to Alfons Crespo and his team for developing the new homepage and for acting as webmaster. But we would also like to thank Professor Juan de la Puente, who was the designer and webmaster of the preceding version of the IFAC Homepage.

Gusztav Hencsey  
Newsletter Editor

# **New IFAC Award**

At the last IFAC Council- and Related Meetings in Patras, Greece, discussions took place concerning the establishment of a new IFAC Award. The purpose of this new award would be to acknowledge and award industrial achievements in the area of automatic control. The handling and procedure could be similar to the one for the major medals, i.e. the Quazza Medal and the Nathaniel B. Nichols Award. The selection of the awards candidate must be approved by the Council as in the case of the medals to underline the importance of industrial work. Various opinions were discussed, e.g. if the award is to be given to individuals or if it can go to groups in a company or a company as such. It should be like a spotlight on special activities in industrial fields.

In the period that followed suit, the proposal for this new Industrial Achievement Award was further discussed and guidelines developed. The Council then took a vote and endorsed the

## **Industrial Achievement Award**

which will first be presented at the IFAC World Congress in Barcelona, Spain.

**The guidelines for the selection of candidates for this new award are as follows:**

“This is an IFAC award to an individual, or a team of individuals, who has made a significant contribution to industrial applications of control. The award, together with a certificate, is presented to the recipient by the President at each IFAC Congress. Financing is provided by IFAC.

### **Selection Committee**

The award is given by the IFAC Council on the recommendation of a Selection Committee. The chair of this Committee is nominated by the Council and the members are nominated by the Selection Committee Chair, all of them being appointed by the President on behalf of the Council.

### **Nomination Procedure**

Not less than 18 months before the start of the Congress at which the medals are presented, the IFAC Secretary invites nominations from the NMOs and TCs. Call for nominations should also be issued to individuals through IFAC periodicals, the IFAC Newsletter and the IFAC Home Page. Nominations should contain:

- Summary of the contributions
- a Curriculum Vitae
- Supporting letters
- Suggested citation

The Secretariat should make sure that the nomination material is complete and request additional material if necessary. IFAC Officers are not eligible. The Selection Committee and the Council may add further suitable candidates for consideration. The list of candidates is considered by the Selection Committee which recommends a candidate and a runner up to the Council no less than 12 months prior to the Congress in question.

### **Selection Criteria**

The award is given in technical fields covered by IFAC. The selection is based on industrial achievements measured in terms of:

- Inventions in the control area
- Engineering significance of products and projects
- Industrial leadership
- Promotion of control technology in industry
- Impact of patents
- International recognition

The award may be given to a team of engineers for joint achievements. There is no requirement that the nominated candidates must have been involved in IFAC. The award can be given to a single achievement (an invention or a leadership of a major project) or a record of achievements over a period of time.

#### **Selection Procedure**

The nominations are distributed to the Selection Committee members by the IFAC Secretariat. Each member makes an individual assessment of the candidates and sends his/her choice of the top five candidates to the chairman. A short list of two to five candidates is prepared possibly by dialog among the committee members. A selection of a winner is made after careful evaluation of candidates and by vote of the Council at least 12 months prior to the Congress in question.”

Following the establishment of this new Award, the Council endorsed the nomination of Professor S. Kahne, IFAC Advisor, as Chair of the Selection Committee.

**Since time is already short for the nomination, Professor Kahne invites nominations this time as follows**

#### **Call for Nominations**

### **Industrial Achievement Award IAA**

**You are kindly invited to send preliminary proposals for candidates to:**

**kahne@pr.erau.edu  
and  
secr@ifac.co.at**

**by  
May 1, 2001**

**The criteria are as given in the paragraph “Selection Criteria” in the article on the Industrial Achievement Award in this Newsletter.**

**Professor Kahne will then review the brief proposals and invite complete proposals for submission.**

#### **Papers from Control Engineering Practice Papers from the January 2001 Issue**

Evaluating H-infinite Controllers on the NRC Bell 205 Fly-by-wire Helicopter  
(A.J. Smerlas, D.J. Walker, I. Postlethwaite, M.E. Strange, J. Howitt, A.W. Gubbels)  
A Design of Gain-scheduled Control for a Lienar Parameter Varying System: An Application to Flight Control  
(C.H. Lee, M. Shin, M.J. Chung)  
A Pneumatic Muscle Actuator Driven Manipulator for Nuclear Waste Retrieval  
(D.G. Caldwell, N. Tsagarakis, G.A. Medrano-Cerda, J. Schofield, S. Brown)  
On-line Evolution of Robust Control Systems: An Industrial Active Magnetic Bearing Application  
(P. Schroder, B. Green, N. Grum, P.J. Fleming)  
Identification in Closed-loop: A Powerful Design Tool (Better Design Models, Simpler Controllers)  
(I.D. Landau)  
VSS Motion Control for a Laser-cutting Machine  
(A.Hace, K. Jezernik, M. Terbuc)  
Torsional Displacement Compensation in Position Control for Machining Centers  
(H. Lim, J.-W. Seo, C.-H. Choi)  
Implementation of Indirect Neuro-control for a Nonlinear Two-robot MIMO System  
(J.Oh. Jang)  
Path Guidance and Control of a Guided Wheeled Mobile Robot  
(S.-F. Wu, J.-S. Mei, P.-Y. Niu)  
Nonlinear Receding Horizon Sub-optimal Guidance Law for the Minimum Interception Time Problem

(M. Alamir)

Conference Calendar

### Papers from the February 2001 Issue

A Nonlinear Industrial Model Predictive Controller Using Integrated PLS and Neural Net State-space Model

(H. Zhao, J. Culver, R. Neelakantan, L.T. Biegler)

Application of System Identification Techniques to Aircraft Gas Turbine Engines

(C. Evans, P.J. Fleming, D.C. Hill, J.P. Norton, I. Pratt, D. Rees, K. Rodriguez-Vazquez)

Control Design of Spinning Rockets Based on Co-evolutionary Optimization

(H.I. Lee, B.-C. Sun, M.-J. Tahk, H. Lee)

A Nonlinear Friction Compensation Method Using Adaptive Control and its Practical Application to an In-parallel Actuated 6DOF Manipulator

(J.-J. Ryu, J. Song, D.-S. Kwon)

Adaptive Friction Compensation Using Extended Kalman-Bucy Filter Friction Estimation

(L.R. Ray, A. Ramasubramanian, J. Townsend)

Identification and Experimental Validation of a Scalable Elevator Vertical Dynamic Model

(Y.M. Cho, R. Rajamani)

Special Section on Space Robotics

Preface to the Special Section on Space Robotics

An Inverse Kinematics Algorithm for Interaction Control of a Flexible Arm with a Compliant Surface

(B. Siciliano, L. Villani)

Rotational Motion-damper for the Capture of an Uncontrolled Floating Satellite

(S. Matunaga, T. Kanzawa, Y. Ohkami)

Coordinated Control of a Satellite-mounted Manipulator with Consideration of Payload Flexibility

(S. Taniwaki, S. Matunaga, S. Tsurumi, Y. Ohkami)

Calibration of Controls in Steering Nonholonomic Systems

(I. Duleba, J.Z. Sasiadek)

Conference Calendar

### Papers from Automatica

### Papers from the February 2001 Issue

#### Editorial

Editorial – Reviewer's commendations

(H. Kwakernaak)

#### Papers

Optimal and Nonlinear Decoupling Control of Systems with Sandwiched Backlash

(Gang Tao, Xiaoli Ma, Yi Ling)

Monte Carlo Filters for Nonlinear State Estimation

(E. Bolviken, P.J. Acklam, N. Christophersen, J.-M. Stordal)

Feedback Invariants of Restrictions. A Polynomial Approach

(I. Zaballa)

#### Brief Papers

Adaptive Control of Input-constrained Type-1 Plants Stabilization and Tracking

(F.Z. Chaooui, F. Giri, M. M'Saad)

H-infinite Control and Robust Stabilization of Two-dimensional Systems in Roesser Models

(Chunling Du, Lihua Xi, Cishen Zhang)

Control of Vibrations in Multi-mass Systems with Locally Controlled Absorbers

(D. Filipovic, D. Schröder)

LPV Systems with Parameter-varying Time Delays: Analysis and Control

(F. Wu, K.M. Grigoriadis)

Fixed Poles of Disturbance Rejection by Dynamic Measurement Feedback: A Geometric Approach

(B. Del-Muro-Cuellar, M. Malabre)

Tracking of Multiple Maneuvring Targets in Clutter Using IMM/JPDA Filtering and Fixed-lag Smoothing

(B. Chenait, J.K. Tugnait)

Adaptive Control for Linear Slowly Time-varying Systems Using Direct Least Squares Estimation

(D. Dimogianopoulos, R. Lozano)

Further Results on Localizations Based Switching Adaptive Control

(P.V. Zhivoglyadov, R.H. Middleton, M. Fu)

Robust Nonlinear Control of Feedforward Systems with Unmodeled Dynamics

(M. Arcaç, A. Teel, P. Kokotovic)

Control-relevant Experiment Design for Multivariable Systems Described by Expansions in Orthonormal Bases

(B.L. Cooley, J.H. Lee)

Sampled-data Iterative Learning Control for Nonlinear Systems with Arbitrary Relative Degree

(Mingxuan Sun, Danwei Wang)

#### Technical Communiques

The Use of Routh Array for Testing the Hurwitz Property of a Segment of Polynomials  
(Chyi Hwang, Shih-Feng Yang)  
Fixed Poles of Simultaneous Disturbance Rejection and Decoupling: A Geometric Approach  
(J.-F. Camar, M. Malabre, J.-C. Martinez-Garcia)  
A Switched Server Systems or Order  $n$  with all its Trajectories Converging to  $(n-1)$  Limit Cycles  
(A.V. Savkin, A.S. Matveev)  
Robust Stabilization of Uncertain Input-delayed Systems Using Reduction Method  
(Young Soo Moon, P. Park, W.H. Kwon)  
Some Geometric Properties of Lyapunov Equation and LTI System  
(Wie Xing, Qingling Zhang, J. Zhang, Q. Wang)

#### **Book Reviews**

Advanced Modern Control System Theory and Design, by M. Stanley  
(J. Smieja)  
Fuzzy Controllers, by L. Reznik  
(B. Bona)  
Algorithms for Linear Quadratic Optimization, by V. Sima  
(P.A. Iglesias)  
Control of Uncertain Sampled-data Systems, by G.E. Dullerud  
(Xinkai Chen)

### **Papers from the March 2001 Issue**

#### **Papers**

Computationally Efficient Steady-state Multiscale Estimation for 1-D Diffusion Processes  
(T.T. Ho, G. Fieguth, A.S. Willsky)  
On the Design of a Stable Adaptive Filter for State Estimation in High Dimensional Systems  
(H.S. Hoang, R. Baraille, O. Talagrand)  
LPV Control and Full Block Multipliers  
(C.W. Scherer)  
Robust Identification of Continuous Systems with Dead-time from Step Responses  
(Qing-Guo Wang, Y. Zhang)  
Model-based Update in Task-level Feedforward Control Using On-line Approximation  
(D. Gorinowsky, G. Vukovich)

#### **Brief Papers**

Manufacturing Systems with Random Breakdowns and Deteriorating Items  
(E.-K. Boukas, Z.K. Liu)  
H-infinite Control and Filtering of Discrete-time Stochastic Systems with Multiplicative Noise  
(E. Gershon, U. Shaked, I. Yaesh)  
Nonlinear Learning Control for a Class of Nonlinear Systems  
(C. Ham, Z. Qu, J. Kaloust)  
A Receding Horizon Approach to the Nonlinear H-infinite Control Problem  
(L. Magni, H. Nijmeijer, A.J. van der Schaft)  
On Robustness and Precision of Mobile Robot Missions  
(T. Hamel, D. Meizel)  
Numerically Constructible Observers for Linear Time-varying Descriptor Systems  
(N. Biehn, S.L. Campbell, R. Nikoukhah, F. Delebecque)  
Growth Rate Conditions for Uniform Asymptotic Stability of Cascaded Time-varying Systems  
(E. Panteley, A. Loria)  
An LMI condition for Robust Stability of Polynomial Matrix Polytopes  
(D. Henrion, D. Arzelier, D. Peaucelle, M. Sebek)  
Recursive Identification Algorithms for Continuous-time Nonlinear Plants Operating in Closed-loop  
(I.D. Landau, B.D.O. Anderson, F. De Bruyne)

#### **Technical Communique**

Switched Controllers and their Applications in Bilinear Systems  
(Z.G. Li, C.Y. Wen, Y.C. Soh)

#### **Correspondence**

Correction to "Constrained Model Predictive Control: Stability and Optimality"  
D.Q. Mayne, J.B. Rawlings

#### **Erratum**

Erratum to "A Comment on L-infinite Optimal Control of Continuous-time Systems"  
M.-G. Yoon

## WHO IS WHO IN IFAC



Prof. Uwe Kiencke  
Member of the Technical Board

Prof. Uwe Kiencke was born in 1943 in Oldenburg, Germany. He received his Engineering Diploma from the Dept. of Electrical Engineering, University of Karlsruhe, Germany, in 1967 and his Doctor Degree from the Department of Electrical Engineering, University of Braunschweig, Germany in 1972.

From 1972 to 1981 he was development engineer, group leader, assistant department manager in the advanced development group of Robert Bosch Company, Schwieberdingen, Germany. Major projects were: the system development of fuel injection, ignition and anti skid braking control systems, as well as the silicon integration of dedicated circuits such as a real-time microcontroller for automotive applications. From 1981 to 1982, he headed an advanced system development department with about 35 engineers. The major focus was modelling and automatic control of various engine and vehicle dynamics systems. Prof. Kiencke also initiated and headed the development of the Controller Area Network (CAN), which is a de-facto standard for automotive communication world-wide.

From 1988 to 1992, he was Group Director for Research and Development with Siemens Automotive in Regensburg, Germany, with around 450 engineers reporting to him at the end of that phase. In this position, he learned a lot about business management and marketing strategies in a company's start-up phase. His division succeeded to break even in 1991 and to penetrate the highly competitive automotive supply market.

From 1992 on, he joined the University of Karlsruhe, Germany, as a head of the laboratory of Industrial Information Technology with 18 doctoral students at this point in time. His research interests are in Automotive Control Systems and Distributed Discrete Event Systems. Due to good industrial contacts, most research projects are done in co-operation with companies in the automotive and the automation industry. From 1993 to 1999 he was Chairman of the IFAC Technical Committee on Automotive Control. Since 1999 he has been Chairman of the IFAC Co-ordinating Committee on Transportation and Vehicles. In March 2001, he will host the third IFAC Workshop "Advances in Automotive Control" in Karlsruhe, Germany.