16th IFAC World Congress
Final Report - Continued
Prague, Czech Republic, 4 - 8 July, 2005

Contents:

As already announced in the last issue of the IFAC Newsletter (5/05), we shall continue the information on the IFAC World Congress in Prague, by publishing further excerpts from the Final Report, compiled by Petr Horacek.

Milestone Sessions

Milestone Sessions were a special form of a panel discussion organized by the IFAC Technical Board. In this context, status reports were presented, describing progress in systems and signals, design methods, computers, cognition and communication, mechatronics, robotics and components, manufacturing, industrial automation, transportation, bio & ecological systems and social systems made between Congresses. Nine reports were compiled, following the structure of the Technical Board with nine Coordinating Committees.

1. Trends in Systems and Signals
The Status Report was prepared by the IFAC Coordinating Committee on Systems and Signals, i.e. by T. Katayama, T. McKelvey, A. Sano, C. Cassandras and M. Campi. The report discussed problems and methodologies that lie in the broad scope of systems and signals, with special focus on modeling, identification and signal processing; adaptation and learning; discrete event and hybrid systems; and stochastic systems. A common theme underlying all these areas is that problems in control systems and signals are usually defined and best studied in the framework of stochastic approach. Although there are common precepts among all these technologies, there are also many unique topics within each area. The key problems in each technology were explained, followed by a discussion on recent major accomplishments with trends, and forecasts.

2. Theory, Algorithms and Technology in the Design of Control Systems
The Status Report was prepared by the IFAC Coordinating Committee on Design Methods. The authors were R. Bars, P. Colaneri, C. E. de Souza, F. Allgöwer, A. Kleimenov and C. Scherer. The report gave an overview of the current key problems in control theory and design, evaluated recent accomplishments and forecast some new areas. Design of very large distributed systems was presented as a new challenge to control theory including robust control. Control over the networks has become an important application area. Development and use of systems of virtual reality was also mentioned. Distributed hybrid control systems involving extremely large number of interacting control loops, coordinating large number of autonomous agents, handling very large model uncertainties will be in the center of future

research. New achievements in bioinformatics will result in new applications.

3. Information and Communication Technology in Control
The Status Report was prepared by the IFAC Coordinating Committee on Computers, Cognition and Communication, W. A. Halang, R. Sanz, R. Babuska and H. Roth. A new approach in control engineering "Information Processing for Action'" was presented, in which control, computers, communication and cognition play equal roles in addressing real-life problems from very small-scale devices to very large-scale industrial processes and nontechnical applications. Thus, the C2 paradigm of "Computers for Control" is shifting towards the C4 paradigm of "Computers, Communication and Cognition for Control" providing an integrated perspective on the role computers play in control systems and control plays in computer systems. This change is mainly due to new developments in computers and knowledge management, and the rapidly emerging field of telecommunications providing a number of possible applications in control. Control engineers will have to master computer and software technologies to be able to build the systems of the future, and software engineers need to use control concepts to master the ever-increasing complexity of computing systems.

4. Mechatronics, Robotics and Components for Automation and Control
The Status Report was prepared by the IFAC Coordinating Committee on Mechatronics, Robotics and Components, A. Ollero, S. Boverie, R. Goodall, J. Sasiadek, H. Erbe and D. Zuehlke. The report was devoted to the analysis of a broad field of mechatronics, robotics and components for automation and control systems. Several subfields were considered: i) components and instruments, involving sensors, actuators, embedded systems and communications; ii) mechatronics concepts and technologies; iii) robotics; iv) human-machine systems, including technical issues and social implications; and v) cost-oriented automation which is a multidisciplinary field involving theory, technologies and application as well as economical and social issues. First current key problems in this field were introduced, then the accomplishment and trends were analyzed. Finally, the forecast was presented.

5. From Plant and Logistics Control to Multi-Enterprise Collaboration
The Status Report was prepared by the IFAC Coordinating Committee on Manufacturing

Systems, S. Y. Nof, G. Morel, L. Monostori, A. Molina and F. Filip. Problems like management of complexity, scalability, increasing costs, coordination and market-based resource allocation, including recent accomplishments and trends, were discussed. The trends in control and automation techniques, manufacturing plant automation, collaborative control through integration and networking, and control methods applied to extended enterprises and large-scale critical infrastructure were presented. A forecast for the next generation manufacturing system; e-work; integration, coordination and collaboration; networked, distributed decision support (NDSS); and active middleware was shown.

6. Monitoring and Control of Process and Power Systems: Towards New Paradigms

The Status Report was prepared by the IFAC Coordinating Committee on Industrial Systems, D. Dochain, W. Marquardt, S. Chul Won, O. Malik, and M. Kinnaert. Process and power plant control, along with fault detection/isolation are being addressed by significant on-going research with many theoretical developments focused on improvements for all of these major industrial applications. The report provided an overview of the current key problems, recent accomplishments and trends, as well as a forecast of anticipated developments within this very important field of industrial applications.

7. The Impact of Automatic Control on Recent Developments in Transportation and Vehicle Systems

The Status Report was prepared by the IFAC Coordinating Committee on Transportation Systems, U. Kiencke, L. Nielsen, R. Sutton, K. Schilling, M. Papageorgiou and H. Asama. The report focused on the rising need for transportation services and the demand for a higher safety level. While each domain takes a specific approach to deal with these demands, a general trend towards automatic co-pilots or even autopilots is visible. In the automotive domain, this is aided by the design of drive-by-wire systems. In other fields, like marine or aerospace systems, the focus of research is on the swarming behavior of multiple vessels. New sensors and networking will also enable more efficient traffic flow control, which will allow for a better use of the resource network capacity. Another reported trend in the vehicle systems sector was modelling of nonlinear system behavior, which has started to replace look-up tables in real time systems.

8. Dealing with Bio- and Ecological Complexity: Challenges and Opportunities

The Status Report was prepared by the IFAC Coordinating Committee on Bio- and Ecological Systems, E. Carson, D. Dagan Feng, M.-N. Pons, R. Soncini-Sessa and G. van Straten. The complexities of the dynamic processes and their control associated with biological and ecological systems offer many challenges for the control engineer. Over the past decades the application of dynamic modelling and control has aided understanding of their complexities. At the same time using such complex systems as test-beds for new control methods has highlighted their limitations (e.g. in relation to system identification) and has thus acted as a catalyst for methodological advance. This paper continues the theme of exploring opportunities and achievements in applying modelling and control in the bio- and ecological domains.

9. Control System Approaches for Sustainable Development and Instability Management in the Globalization Age

The Status Report was prepared by the IFAC Coordinating Committee on Social Systems, A. Talha Dinibütün, R. Neck, J. Stahre, G. M. Dimirovski, L. B. Vlacic and F. Kile. Advanced information technologies resulting from automation of control and decision expertise have a multitude of impacts on development of national economies within the global economy. The broad area of social systems, being essentially human centered systems, is a cross-, inter- and multi-disciplinary challenge to the control community. Social systems in modern civilization, currently undergoing globalization, were reviewed from the systems science viewpoint and on the grounds of recent developments in control science and technology. Recent developments put new emphasis on the social responsibility of the control and automation field during the on-going changes from the cold-war bipolar world to a unipolar one on the way to mankind's multi-polar world of the future. The focus should be on innovative systems approaches, employing new paradigms, to combined knowledge and technology transfer world-wide, that may remedy some of the negative aspects of globalization.

Survey Papers

A number of survey papers, characterized by a particularly broad scope of the overviewed problems, was submitted. As it is not possible to go through all of them let's focus on those that were of interest to the widest audience.

The paper by **R. Neck** gave an introduction to the theory of dynamic games and presented economic applications of the theory. The survey by **A. Dolgui et al.** was focused on the parameterization of material requirement planning systems under demand and lead-time uncertainties. Infinite time linear-quadratic control problem was discussed by **J. C. Willems et al.** from a behavioral point of view. Promising approaches for enhancing the performance of intelligent control systems facing higher level of complexity and uncertainty were surveyed by **R. Herzallah**. The paper by **Il Seop Choi et al.** investigated strong and weak points of various control algorithms in the looper-tension technology in hot rolling mills. Another survey by **D. Major et al**. focused on fundamental and practical aspects of pulp bleaching control. The paper by **G. Morel et al.** summarized the key problems, trends and accomplishments of manufacturing plant control. An overview of recent advances in wireless communication technologies applied to industrial automation was provided in **Mogens L. Mathiesen et al**. The paper by **R. Harrison et al.** made a case for the widespread adoption of a collaborative automation paradigm, which promises to provide more flexible and reconfigurable production systems. **A. Ilchmann** surveyed the development of the algebraic theory of time-varying linear systems, while **P. Biswas et al.** gave a survey on stability analysis of discrete-time piecewise affine systems. The paper by **T. Salsbury** described the state of the art in control in building automation industry and reviewed new and emerging technologies in this particular field. The paper by **K. E. Arzén and A. Cervin** provided a survey of the role of feedback control in embedded real-time systems and highlighted recent research efforts and future research directions in this research area.

Panel Sessions

Four panel sessions were organized. Three of them were part of the Industry Days program and one was educational.

"*Infotronic Technologies for e-maintenance Regarding the Cost Aspects*" was a panel organized by G. Morel (CRAN Institute, Univ. Nancy), J. Lee (IMS Center, University of Cincinnati), H. Erbe (TU Berlin), G. Seliger (TU Berlin and Fraunhofer IPK- Berlin), M. Hecht (TU Berlin, Rail Vehicles), E. Hohwieler (Fraunhofer IPK-Berlin), F. Kimura (Univ. of Tokio), H. Hang (Texas Tech College of Engineering) and D. Kiritsis (EPF, Lausanne). The panel hosted leaders from equipment and service users, equipment and service providers, and experts from academia. Industrial panelists discussed and addressed issues and challenges to realize cost effective e-maintenance strategies. Academic leaders presented the state-of-the-art technologies and tools with examples.

An exchange of experience with implemented prognostics of expected equipment failures based on condition monitoring predicting degradation was the main focus of the session "*Collaborating Robotic Systems (Human – Robot, Robot – Robot)*" with a panel organized by H. Erbe and R. Bernhardt. The role of collaboration of human operators and automation systems like robots to achieve more flexibility in production and saving cost by avoiding repeated reconfiguration of the systems was discussed. Collaborative Robots (COBOTS), or intelligent power assist devices (IPAD) were presented. Compared to the existing systems, the IPAD was described as advantageous with appreciably lower costs, significantly improved ergonomics, simpler intuitive operation, rapid movements with a higher level of precision and considerably reduced stress during manipulation of heavy loads. Stand-alone industry robots are used in a structured environment for welding, painting, and handling. The collaboration of those units in material handling and processing for saving time and manufacturing cost was discussed.

"*Industrial Perspectives on Process Control*", was one of the key events of the second Industry Day, organized by W. Marquardt, A. Isaksson,.B. J. Cott, K.-U. Klatt and J. A. Mandler. This panel discussion provided a forum which allowed representatives of major industrial sectors from the U.S. and Europe (ABB, Shell, Bayer, Air Products) to discuss successful applications of Process Control in industrial practice, to identify major needs and opportunities for application of advanced Process Control in industrial problems, and to discuss the interaction between academic research in Process Control and industrial practice.

"*Rethinking Control Education in the Modern World*" was organized by L. Vlacic. In an effort to make the discipline of control more attractive to students the subject is often introduced as an enabling technology in the context of embedded electronic systems, intelligent robots, mechatronic systems, advanced communication systems, space technology, etc. While this approach works well in promoting the field of control, it raises the following questions, however: how much of the advanced computing technology do we need to use in presenting the basic control topics; are we going to fall into the trap of being technology-driven and thus start to lose analytical problem solving skills; are we about to change the way we teach control; are all of these approaches going to change the profile of the control discipline? The questions were discussed by the panelists, C. G. Cassandras, T. Djaferis, S. Dormido, S. Kahne and M. Spong.

Tutorials and Workshops

Numerous tutorial- and workshop proposals were received and evaluated by the IPC. Not all the proposed tutorials and workshops could be implemented on account of the number of registrations received. The following events formed the two day pre-Congress program.

Tutorials

"*Control Applications in Physics: From Control of Chaos to Quantum Control*" by A. Fradkov, H. Nijmeijer and S. Sieniutycz. In the tutorial a number of new application fields, related to studying properties of physical systems by means of feedback, were exposed. The subject and methodology of cybernetical physics was outlined. Methods of energy control in conservative and

dissipative systems were presented. Applications in physics: feedback resonance phenomenon in nonlinear oscillators, escape from potential wells, control and synchronization in oscillatory chains, etc. were shown. The emerging field of controlling chaotic behavior was presented. Among other methods, feedforward control by periodic signal, linearization of Poincare map (OGY method), and delayed feedback (Pyragas method) were analyzed. Concepts and results related to controlled synchronization were outlined. A brief exposition of control thermodynamics was given on treating physical or economical problems of optimal control and behavior of physical or practical systems under prescribed external conditions that were predicted from suitable variational or extremum principles. An introductory outline of the field related to control of molecular systems, based on both classical and quantum description of the controlled molecular motion, was made.

"Techniques for Control of Distributed Process Systems" by P. Christofides, D. Dochain, P. Daoutidis and A. Armaou. Advanced techniques for control of distributed process systems were presented, starting with an overview of distributed process control problems and modelling of distributed process systems. Techniques for control of nonlinear distributed parameter systems, including problems of nonlinear parabolic and hyperbolic PDEs: order reduction, feedback control design, closed-loop stability, handling of practical control issues: robust and adaptive control design for model uncertainty compensation, control subject to input and state constraints including Lyapunov-based and predictive control, control subject to delays, reduction and control of two-time-scale hyperbolic PDEs, were shown. Techniques for control of stochastic distributed parameter systems and modelling of stochastic processes with emphasis on thin film growth, identification of stochastic distributed models and feedback control design with applications were explained.

"TrueTime: Real-Time Control System Simulation Using MATLAB/Simulink" by D. Henriksson, A. Cervin, M. Andersson and K.-E. Arzen. TrueTime is a tool that offers systemwide simulation of the temporal behavior of multi-tasking real-time kernels executing controller tasks. TrueTime also makes it possible to simulate models of common communication network protocols and their influence on networked control loops. The tutorial was a mini-course about the TrueTime simulator and its intended use in the design of real-time control systems. A number of interactive examples were presented to visualize the various aspects of the simulator, e.g. the effect of task scheduling on control performance, task synchronization using monitors and events, interrupt handling and handling of task overruns, and control over wired and wireless networks.

Workshops
"The Power, Beauty and Excitement of the Cross-Boundaries Nature of Control" was a workshop organized by L. Vlacic and B. Pasik-Duncan. (For a detailed description of this Workshop, cf Newsletter Issue 5, October 2005.) The Workshop was sponsored by IFAC and IEEE. The Workshop aimed at inspiring the interest from youth towards studies in Automatic Control and at assisting high-school teachers in promoting the discipline of Automatic Control among their students. It was composed of several short but effective presentations on various problems from the real world that had been solved by using control engineering methods, techniques and technologies. The attractiveness and excitement of choosing a career in control engineering was addressed. Live interaction between the presenters and the audience was an important feature of the Workshop. The speakers were T.E. Djaferis (University of Massachusetts, Amherst), C. G. Cassandras (Boston

University), M. W. Spong (Urbana), P. Horacek (Czech Technical University in Prague), B. Pasik-Duncan (University of Kansas) and L. Vlacic (Griffith University).

"Nonlinear Model Predictive Control: Introduction and Current Topics" was organized by R. Findeisen, F. Allgöwer, M. Diehl, L. Magni and Z. Nagy. The focus of this activity was twofold. Besides an in-depth introduction to the basic ideas and principles of (nonlinear) predictive control, current application- and research issues in NMPC ranging from stability and robustness, output-feedback, efficient numerical solution to implementation aspects, were discussed. For this purpose the course was split up in six parts: an introduction as well as a historical review of predictive control, how to achieve nominal stability of the closed-loop using NMPC, the robust design of NMPC, an overview on output-feedback in conjunction with NMPC, numerical solution and implementation of NMPC, and applications.

"Fault Tolerant Control of Large Complex Systems" was organized by L. Marconi and A. Paoli. This full-day workshop aimed at giving an overview of the recent research activity in the area. The program included a general introduction to the fault tolerant control problem with some definitions and description of structural properties of fault tolerant systems. Fault tolerant control architectures in the framework of distributed systems were the key subjects. Methods to design fault tolerant control systems based on different classes of models were presented and illustrated. Nonlinear systems with uncertainties and discrete event systems (both deterministic and stochastic) were considered and possible solutions to the FTC problem were presented. The speakers were M. Staroswiecki, M. Kinnaert, L. Marconi, T. Parisini, Jakob Stoustrup, Andrea Paoli, N. E. Wu and J. L. Speyer.

"Wireless Sensor Networks and Cooperating Objects" was organized by A. Ollero and A. Wolisz. the Workshop explored the concept of networked embedded devices, where the intelligence in the devices is not only used to simply obtain information about the environment / the supervised "system", but also to exert control over it, which in turn requires intelligence in the devices to make decisions. The workshop reviewed concepts, technologies and applications in wireless sensor networks as well as in cooperating embedded systems for control. The workshop program was inspired by the coordination action entitled "Cooperating Embedded Systems for Exploration and Control featuring Wireless Sensor Networks" (Embedded WiSeNts) funded by the European Commission in the Sixth Framework Program (Information Society Technologies).

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Acknowledgement to IFAC would be appreciated.

IFAC Journals

The Tables of Contents of the IFAC Journals can be found respectively at

Automatica
http://www.elsevier.com/locate/automatica

Control Engineering Practice
http://www.elsevier.com/locate/conengprac

Engineering Applications of Artificial Intelligence
http://www.elsevier.com/locate/engappai

Journal of Process Control
http://www.elsevier.com/locate/jprocont

Annual Reviews in Control
http://www.elsevier.com/locate/arcontrol

Journal on Mechatronics
http://www.elsevier.com/wps/find/
journaldescription.cws_home/933/
description#description

Annual Reviews in Control
A Journal of IFAC the International Federation of Automatic Control
Fall Issue 2005

Table of Contents

Technical Board Reports Success

The end of a triennial period is always also the point of time to review the activities of the Technical Board. I had the opportunity to do so on the occasion of the General Assembly of IFAC in Prague, CZ, on July 4, 2005


M. Masten addressing the General Assembly

The technical activities of IFAC are organized into three-year increments between IFAC World Congresses. The most recent 2002-05 triennium was completed in July at the Prague World Congress, at which time the IFAC Technical Board reported several record setting accomplishments.

Technical Meetings / Conferences

Since the 2002 World Congress in Barcelona, IFAC has been involved in organizing and conducting 86 technical meetings and conferences. Most of the meetings occurred in 2003 and 2004 - in just about every month of the year.
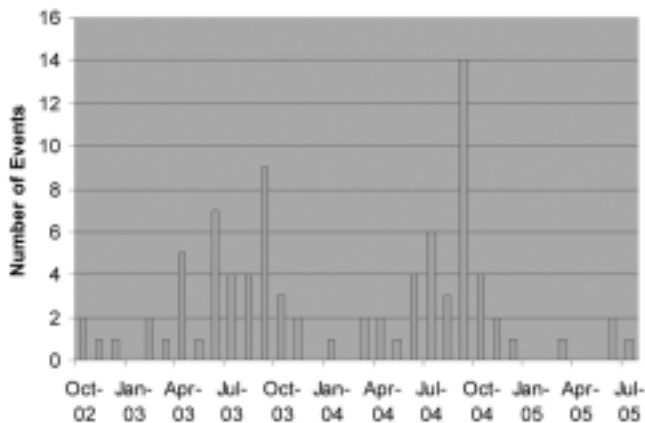
Triennial IFAC Meeting Statistics

· Sixty-three (63) of the 86 meetings were international events planned and organized by IFAC. The IFAC World Congress is of course the premier event among these IFAC meetings.

· Eighteen (18) events originated by other organizations who invited IFAC to become a co-sponsor. IFAC has various duties in the organization of these co-sponsored events.

· Five (5) conferences were regional events held "in cooperation with IFAC". These are fairly large meetings held in Europe, Asia, and North America.

Total attendance at the 63 IFAC organized events is estimated at 9568. Most of these IFAC meetings are relatively small - with an average attendance of around 115 - which enables intimate interaction and detailed discussions among the participants. However, some are fairly large; obviously, the World Congress is heavily attended with participants from virtually every nation. For the 63 IFAC events, 32 different IFAC National Member Organizations (NMO) were involved.

The World Congress is always the largest IFAC event in any given triennium, and the recent Congress in Prague (with an attendance of 2462) is the largest meeting of control engineers in history! The number of papers presented at the Congress was 2456 - which were written by 5162 authors. The IFAC Technical Committees were responsible for evaluation, review, and selection of the papers which were ultimately presented at the Congress; there were 2054 individuals who served as paper reviewers, and over 8000 reviews were completed in the process. Participants at the Congress came from 63 different countries.

Adding the *co-sponsored* and *regional meetings* to the 63 IFAC events, it is obvious that at least 12000 people have attended IFAC related events in the last triennium! Although the precise numbers have not been tabulated, a similar number of technical papers were likewise written and presented at these events. Therefore, IFAC has clearly been a major contributor to the world's dissemination of control technology and knowledge.

Analysis of long term trends (since the 1970s) shows that the number of IFAC events has increased significantly in the last two and a half decades. At the present time – midway through the first decade of the 21st century, the total number of people attending IFAC events has more than doubled (since the 1990s).

Milestone Reports

During the 2002-05 triennium, there were 39 IFAC Technical Committees that organized conferences, wrote papers, and coordinated various IFAC technical activities. The 39 Technical Committees were organized into nine (9) major categories,

Systems and Signals
Design Methods
Computers, Cognition and Communications
Mechatronics, Robotics, and Components
Manufacturing Systems
Industrial Systems
Transportation and Vehicle Systems
Bio- and Ecological Systems
Social Systems

Prior to the World Congress, *Milestone Reports* were written for each of these categories. These reports review the current state of control & automation, describe recent accomplishments, identify key developing trends & challenges, and forecast anticipated future directions within our field. The reports cover both theoretical methodologies and major applications, and they were published in the *Proceedings of the World Congress*. Panel Sessions were also held at the Congress where each of the Milestone Reports was discussed in an open forum that enabled Congress participants to also participate. (cf also pages 1&2 of this Newsletter issue) The 2005 *Milestone Reports* will be further upgraded and published in a forthcoming 2006 issue of IFAC's *Annual Reviews in Control*.

Emerging Areas

IFAC seeks to promote all theories and applications of control; therefore the IFAC Technical Board continually identifies major trends and forecasts emerging areas within our field. The last *formal* activity that addressed this goal was held in Rotterdam in 2003; a workshop was held, where over 50 potential future developments were suggested and discussed. At the conclusion of the workshop, a Panel Session was held at which five (5) major trends were identified. (The Workshop and Panel results were reported in the December, 2003 *IFAC Newsletter* and copies of these reports are available from IFAC, if requested.) In addition, a new IFAC Technical Committee (Networked Systems) began in 2005 to address one of the major developments which we believe need additional emphasis. The next *Emerging Areas Workshop* will be held in 2006.

Industrial Involvement

IFAC maintains ongoing efforts to increase interactions with - and relevance to - industry. *Industry Days* were organized at the 2005 World Congress to provide a specific opportunity for such interactions. These two-days of the Congress focused on plenary presentations of special interest to industry, selected Panel Sessions, and "industry" technical sessions. Special invitations were extended to manufacturers of automation technologies (hardware, software, solutions), R & D laboratories who specialize in control, and users of our technology. Participation was highest from the automotive industry, transportation, and process control (chemical processes, steel production, paper & pulp, mineral processing). Industrial-affiliation authors at the IFAC Congress came from 176 companies located in 30 different countries.

The Future

The IFAC Technical Committees are active and energized, and the Technical Board has organized itself to be responsive to future opportunities. As of June 1, the Technical Board had already received applications for 47 IFAC events and 5 invitations for IFAC to co-sponsor events with other organizations. This total is already well over one-half of the total 86 events that occurred in the 2002-05 triennium. Obviously, more applications will come to IFAC in the next three years - so we are certainly confident that IFAC's aggressive meeting schedule and list of technical accomplishments will continue.

Michael K. Masten

Title	2006	Place	Further Information
IFAC Symposium Mathematical Modelling – 5th MATHMOD	February 08 – 10	Vienna Austria	http://www.mathmod.at email: inge.troch@tuwien.ac.at
IFAC Workshop Programmable Devices and Embedded Systems - PDeS	February 14 – 16	Brno Czech Rep.	www.pdes2006.feec.vutbr.cz e-mail: pdes2006@feec.vutbr.cz
IFAC Workshop Control Applications in Post-Harvest and Processing Technology CAPPT 2006	March 26 – 29	Potsdam Germany	http://CAPPT2006.atb-potsdam.de e-mail: cappt2006@atb-potsdam.de
IFAC Symposium System Identification – SYSID 2006	March 29 - 31	Newcastle Australia	http://sysid2006.org e-mail: secretariat@sysid2006.org
IFAC Sympoisum Advanced Control of Chemical Processes - ADCHEM 2006	April 2 – 5	Gramado Brazil	http://www.adchem.org e-mail: adchem@enq.ufrgs.br
IFAC Workshop Control Applications of Optimization	April 26 – 28	Cachan-Paris France	http:www.ens-cachan.fr/cao06 e-mail: sec.ifac.cao06@ens-cachan.fr
IFAC Symposium Information Control Problems in Manu- facturing – INCOM 2006	May 17 – 19	St. Etienne France	http://www.emse.fr/incom06 e-mail: incom06@emse.fr
IFAC Symposium Automated Systems Based on Human Skill and Knowledge	May 22 – 24	Nancy France	http://www.ensgsi.inpl-nancy.fr/ASBoHS06/ e-mail: Laure.Morel@ensgsi.inpl-nancy.fr
IFAC Conference 6th Analysis and Design of Hybrid Systems ADHS'06	June 07 – 09	Alghero Italy	http://www.diee.unica.it/adhs06/ e-mail: adhs06@diee.unica.it
2006 American Control Conference - in cooperation with IFAC -	June 14 – 16	Minneapolis MN, USA	http://www.a2c2.org/conferences/acc2006/ e-mail: misawa@ceat.okstate.edu
IFAC Conference Improving Stability in Developing Nations through Automation – ISA'06	June 15 – 17	Prishtina UN Mission in Kosovo	http://www.ihrt.tuwien.ac.at/swiis2006/ e-mail: mwhan@ihrt.tuwien.ac.at
IFAC Symposium 7th Advances in Control Education –ACE 06	June 21 - 23	Madrid Spain	http://www.dia.uned.es/ace2006/index.html e-mail: ace2006@dia.uned.es
IFAC/IEEE Symposium Power Plant and Power System Control	June 25 – 28	Kananaskis/Alberta Canada	http://ifacpps2006.org/ e-mail: ifacPPS2006@ucalgary.ca
IFACConferences Analysis and Control of Chaotic Systems	June 28 – 30	Reims France	http:// www.univ-reims.fr/chaos06 e-mail: chaos06@univ-reims.fr
IFAC Symposium 5th Robust Control – ROCOND	July 05 – 07	Toulouse France	http://www.laas.fr/rocond06 e-mail: to be announced
IFAC Workshop 6th Time Delay Systems – TDS06	July 10 - 12	L'Aquila Italy	http://www.diel.univaq.it/IFACTDS06 e-mail: to be announced
Asian Control Conference - in cooperation with IFAC	July 18 – 21	Bali Indonesia	http://www.ascc2006.com e-mail: secretariat@ascc2006.com
IFAC Workshop Lagrangian and HamiltonianMethods for Nonlinear Control	July 19 – 21	Nagoya Japan	http://www.robot.kuass.kyoto-u.ac.jp/lhmnlc06/ e-mail: to be announced
IFAC Workshop Fractional Differentiation and its Applications	July 19 – 21	Porto Portugal	http://www.gecad.isep.ipp.pt/FDA06 e-mail: fda06@dee.isep.ipp.pt
IFAC Symposium Control in Transportation Systems	August 29 – 31	Delft Netherlands	http://www.rws-avv.nl/ifac-cts2006 e-mail: ifac-cts2006@avv.rws.minvenw.nl
IFAC Symposium Fault Detection, Supervision and Safety of Technical Processes – SAFEPROCESS	August 30 - September 1	Beijing China	http://www.au.tsinghua.edu.cn/safe/safeprocess2006/ e-mail: safeprocess2006@mail.tsinghua.edu.cn
IFAC Copnference Cost Effective Automation in Networked Product Development and Manufacturing	September 4 – 7	Monterrey Mexico	http:// to be announced e-mail: to be announced

FORTHCOMING EVENTS (ctd.)

Title		Place	Further Information
IFAC Symposium 8th Robot Control – SYROCO	September 6 - 8	Bologna Italy	http://www-lar.deis.unibo.it/syroco2006/ e-mail: cmelchiorri@deis.unibo.it
IFAC Workshop Bio-Robotics III	September 9 – 10	Sapporo Japan	http:// to be announced e-mail: to be announced
IFAC Symposium Mechatronics Systems	September 12 – 14	Wiesloch Germany	http://www.mechatronics2006.com e-mail: ringelmann@vdi.de
IFAC 50th Anniversary Celebration Present and Future of Automatic Control	September 15	Heidelberg Germany	http://www.vdi.de/ifac50
IFAC Symposium 6th Modelling and Control of Biomedical Systems	September 20 – 22	Reims France	http://www.univ-reims.fr/mcbms06 e-mail: mcbms06@univ-reims.fr
IFAC Workshop Automation in Mining, Mineral and Metal Processing	September 20 – 22	Cracow Poland	http://konferencje.polsl.pl/IFAC2006 e-mail: IFAC2006@polsl.pl
IFAC Workshop Energy Saving Control in Plants and Buildings	October 2 – 10	Bansko Bulgeria	http://IFAC_ESC.tu-sofia.bg e-mail: to be announced
IFAC Workshop Nonlinear Model Predictive Control for Fast Systems (NMPC_FS'06)	October 9 – 11	Grenoble France	http://www.lag.ensieg.inpg.fr/NMPC_FS06/ e-mail: NMPC_FS@lag.ensieg.inpg.fr
IFAC Workshop Advanced Process Control for Semi- Conductor Manufacturing	December 4 – 5	Singapore Singapore	http://ifacsm06.nus.edu.sg/index.html e-mail : ifacsm06@nus.edu.sg
Title	**2007**	**Place**	**Further Information**
IFAC Symposium Cost Oriented Automation - COA 07	12 – 14	Habana Cuba	http:// to be announced e-mail: orestes@electrica.cujae.edu.cu
IFAC Symposium Computer Applications in Biotechnology - CAB-10	June 4 – 6	Cancun Mexico	www.lingen.unam.mx/CAB-10 e-mail: to be announced
IFAC Symposium Dynamics and Control of Process Systsems - DYCOPS-8	June 6 – 8	Cancun Mexio	http://www.lingen.unam.mx/DYCOPS-8 e-mail: to be announced
IFAC Workshop Dependable Control of Discrete Systems - IFAC DCDS07	June 13 – 15	Paris France	www.lurpa.ens-cachan.fr/dcds07 e-mail: to be announced
IFAC Symposium Automatic Control in Aerospace	June 25 - 29	Toulouse France	http://aca2007.onera.fr e-mail: aca2007@oneracert.fr
2007 American Control Conference - in cooperation with IFAC -	July 11 – 13	New York NY, USA	http://www.a2c2.org/conferences/acc2007/ e-mail: judd@ohio.edu
IFAC Symposium 11th Large Scale Systems: Theory and Applications	July 23 – 25	Gdansk Poland	http// to be announced e-mail: to be announced
IFAC Symposium 12th Automation in Mining, Mineral and Metal Processing - MMM	August 21 – 24	Quebec City Canada	http://www.gch.ulaval.ca/ifacmmm07/ e-mail: ifacmmm07@gel.ulaval.ca
IFAC Symposium Nonlinear Control Systems	August 22 – 24	Pretoria South Africa	http:// www.nolcos2007.org.za e-mail: noc@nolcos2007.org.za
IFAC Symposium Analysis, Design and Evaluation of Human-Machine Systems	September 4 – 6	Seoul Korea	http:// to be announced e-mail: to be announced
IFAC Conference Management and Control of Producton and Logistics – MCPL'2007	September 27 – 30	Sibiu Romania	http://mcpl2007.ulbsibiu.ro e-mail: mcpl2007@ulbsibiu.ro
IFAC Symposium System Structure and Control - SSSC 2007	October 17 – 19	Iguacu Brazil	http://www.sssc07.br e-mail: to be announced
Title	**2008**	**Place**	**Further Information**
American Control Conference - in cooperation with IFAC	June 12 – 14	Seattle, WA USA	http:// to be announced e-mail: to be announced
17th IFAC WORLD CONGRESS	July 6 – 11	Seoul Korea	http://www.ifac2008.org e-mail: Secretariat@ifac2008.org