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International Federation of Automatic Control

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Artificial Intelligence in Real-Time Control – AIRTC

IFAC/IMACS Workshop

Bled, Slovenia

November 29 – December 1, 1995

The Workshop represents a continuation of a series of five previous successful events in this field (1988 Swansea, UK; 1989 Shenyang, PRC; 1991 Rohnert Park, CA, USA; 1992 Delft, NL and 1994 Valencia, E). Chairman of the IFAC Technical Committee on Artificial Intelligence in Real-Time Control, Professor Hank Verbruggen suggested Slovenia to be the venue of the next Workshop in this series. The Workshop was then organized under the sponsorship of IFAC and co-sponsorship of IMACS by the Faculty of Electrical and Computer Engineering, University of Ljubljana in cooperation with the Jozef Stefan Institute and the Automatic Control Society of Slovenia, being the official IFAC representative in Slovenia.

From the 60 draft papers submitted, 52 were accepted by the International Program Committee. Each contribution was sent to three or four referees to assure prompt reviewing. Thus, 46 papers were presented at the Workshop, with 5 plenary lectures and 7 invited papers, which means an 88 % participation of the presenting authors. From originally expected 80 participants, 75 actually attended the Workshop, with half of them coming from Slovenia and the other half from 15 other countries.

As was also the case in the previous Workshops, it was the main intention of this one to present the state-of-the-art in the application of artificial intelligence approaches in real-time-control on the one hand and to bring together experts from the areas of control, artificial intelligence and different applications areas.

The main topics of the Workshop were:

- The Usage of Artificial Intelligence Techniques in Control Engineering
 - Neural Nets Control
 - Knowledge Based Control
 - Fuzzy Control
 - Fault Detection and Diagnosis
 - Learning and Genetic Algorithms
- The Applications of Artificial Intelligence Techniques
 - Process Control
 - Robotics
 - Power Systems
 - Other Areas
- Hardware and Software Requirements
 - Temporal Reasoning
 - New Paradigms in Real Time Control
 - Real-Time Environment for Intelligent Control

The technical program of the Workshop featured five plenary lectures, presented by the most outstanding scientists in the respective areas:

AI in the Feedback Loop: A Survey of Alternative Approaches (K.E. Aarzen, Sweden)
Transfer of Control Skill by Machine Learning (I. Bratko, T. Urbancic, Slovenia)

Recent Advances in Fuzzy Modelling and Control (R. Babuska, Czech Rep., H. Verbruggen, Netherlands)

New Developments Using AI in Fault Diagnosis (P.M. Frank, B. Köppen-Seliger, Germany)
Application of RBFNN to Optimal Self-Control (I. Grabec, Slovenia)

Further there were five regular sessions:

Supervisory Control and Fault Detection
Fuzzy Modelling and Control (in two parts)
Expert Systems and Machine Learning in Real-Time Control (in two parts)
Intelligent Control Systems
Artificial Neural Networks for Identification and Control

One invited session had the following subject:

Material Process Design and Control

This comprehensive program was rounded off by one poster session.

There were no parallel sessions. Three commercial presentations of INEA representatives, Slovenia, Digital Equipment Corporation, USA and Wonderware, USA complemented the official program. Authors of two contributions were encouraged to submit their papers to Automatica and eight to submit their papers to Control Engineering Practice for possible publication.

The atmosphere at the Workshop was stimulating. In spite of the fact that the region surrounding Bled is very beautiful indeed, the attendance at the sessions was surprisingly high. The presentations were of a high standard and the discussions that followed were very constructive.

The increasing number of control systems, including AI based components, which are already implemented in industry, demand that they be evaluated scientifically. Therefore, the contributions at the Workshop dealing with these recent achievements in the area, constituted a significant step into this direction. Slovenian scientists also had the opportunity to show their own work and to see the world trends in these areas. One particularly good feature of the AIRTC solutions is that some of the components presented can be implemented on industry scale within a short time at relatively low cost.

It turned out that not only fuzzy control and artificial neural nets are the AI approaches to be used in real time control. Also methods such as machine learning will probably give rise to new ideas and possibilities in the investigated areas. The same can be concluded for fault detection which is very important for the use of AI methods.

Prof. R. Karba
NOC Chairman

IFAC'96 Home Page and FTP Site

Now that the preliminary program including the registration information of the 13th IFAC World Congress in San Francisco is available and was mailed to authors and AACC- and IFAC mailing lists we find that the information is not reaching its destination in a timely fashion in some cases. We therefore have all the information available on the IFAC'96 Home Page on the World Wide Web as well as on an anonymous FTP site for those without access to the WWW.

The IFAC'96 Home page provides complete information about the preliminary program, the registration information, registration and hotel reservation forms (in both PostScript and ASCII format), tour information, and tutorial workshop information. It also allows you to download the draft of the FULL program (which is provided in six sections: one for each day, and an author index).

How to access the information:

You may reach the Home Page using the following Location

<http://web.eecs.nwu.edu/~ahaddad/ifac96.html>

You may also reach the FTP site from the WWW page but you may reach it directly at

<ftp://eecs.nwu.edu>

use login name: anonymous (no password is needed) and check the directory

[/pub/ifac96](ftp://pub/ifac96)

in which you may find all the text files containing the IFAC'96 Program and Registration Information.

If you have any questions please direct them to:

ifac96@eecs.nwu.edu

Phone: 847-491-3641 (please note new area code 847 replaced the old 708)
Fax: 847-491-4455

IMPORTANT NOTE: Registrations via email or fax are not accepted. However, you may download and print the forms to fill and mail as instructed.

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Control of Power Plants and Power Systems

IFAC Symposium (2nd)

Cancun, Mexico, 6 - 8 December, 1995

The Symposium was sponsored by the then IFAC Technical Committee on Applications, Working Group on Control of Power Plants and Power Systems, and was organized by the Instituto de Investigaciones Electricas on behalf of the Asociacion de Mexico de Control Automatico, the National Member Organization of IFAC.

The International Program Committee (IPC) consisted of 24 experts from 14 countries and was chaired by Dr. Roberto Canales. The Symposium provided participants with an overview over current research and application on the control of power plants and power systems. The program included two plenary sessions, one plenary talk, one invited session, and 27 technical sessions with 101 papers selected by the IPC from the 212 abstracts submitted. The contributions came from 34 countries, representing the five continents, which shows the international presence of IFAC.

The first plenary session was presented by Prof. Thomas Dy-Liacco (International Consultant from the USA) on the 'Evolution of Control Center Architectures'; the second was presented by Anthony F. Armor and Joe Weiss (EPRI, USA) on 'Advanced Control for Power Plant Profitability'. The plenary talk was delivered by Prof. Y.H. Pao (Case Western Reserve University, USA) on 'Philosophy, Biology and Progress in Information Processing Technologies: A Historical Perspective'.

The papers covered topics relevant to the fields of control of power plants and power systems. For power plants, subjects included modeling and simulation, self-tuning, predictive, and adaptive control schemes for power plants, control of non-conventional power plants, fuzzy logic and artificial

intelligence applications, power plant operation and fault diagnosis, and monitoring systems. In the power systems' sessions, topics included dynamic stability (4 sessions), voltage control, state estimation, system expansion, security assessment, economical dispatch, optimal load flow, distribution, transient stability and preventive control (2 sessions), dynamic security, control centers and fuzzy logic and artificial intelligence applications. The most pervasive topic in the Symposium was artificial intelligence, with four specific sessions on this subject and most other sessions also dealing with aspects thereof.

The Symposium was attended by 132 participants from 25 countries, 40 of them from Mexico. Twelve registered participants and five non-registered ones did not arrive, thus 17 papers were not presented. Altogether, 84 papers were presented by their authors.

By means of the routing procedure of the IFAC Publications Office, the IPC members and the sessions' chairpersons selected the best papers from those presented in each session. The result of their evaluation were 10 papers suggested for printing in Automatica and 23 papers for Control Engineering Practice. Copies of these articles were sent to both editors-in-chief.

During the Symposium lunch, Dr. Canales thanked all participants for their attendance and their contributions in each session through discussion, comments and questions. Prof. Ernst Welfonder, Chairman of the IFAC Working Group on the topic announced that the 3rd IFAC Symposium on Control of Power Plants and Power Systems will be held in China in 1997.

Newly Approved Events

Title	Date	Place	Deadline	Further Information
IFAC Symposium Advanced Control in Chemical Processes ADCHEM '97	June 9 - 11 1997	Banff Canada	1 June 1996	Prof. S.L. Shah, Dept. of Chem. Engg., Univ. of Alberta Edmonton, Alberta T6G 2G6 Canada FAX: +1/402/492-2881 e-mail: slshah@prancer.eche.ualberta.ca
IFAC Symposium AI in Real-Time Control AIRC	Sept. 23 - 25 1997	Kuala Lumpur Malaysia	1 Dec. 1996	Dr. Marzuki Bin Khalid B.A.T.C. Technical Univ. Jalan Semarak 54100 Kuala Lumpur, Malaysia FAX: +603/2911294 e-mail: marzuki@batserv.batc.utm.my
IFAC/(ISHS) Workshop Mathematical&Control Applications in Agri- culture&Horticulture	Sept. 28 - Oct. 2 1997	Hannover Germany	31 Dec. 1996	VDI-VDE-GMA, POB 101139 D-40002 Düsseldorf, Germany FAX: +49/211/6214-161
IFAC Symposium Intelligent Autonomous Vehicles - IAV	March 25-27 1998	Madrid Spain	*	Prof. Carlos Balaguer, Univ. Carlos III de Madrid, Dept. de Ingenieria, c/Butarque 15 28911 Leganes, Madrid, Spain FAX: +34/1/6249430 e-mail: balaguer@ing.uc3m.es
IFAC Symposium Information Control Problems in Manufacturing INCOM-'98	June 24-26 1998	Nancy France	8 Sept. 1997	INCOM '98/CRAN-GGP Fac. des Sciences, Univ. Henri Poincaré Nancy I, BP 239 F-54506 Vandoeuvre les Nancy France FAX: +33/83912126 e-mail: incom98@cran.u-nancy.fr
IFAC Symposium Low Cost Automation LCA '98	Sept. 8-10 1998	Shenyang China, P.R.	1 Oct. 1997	Prof. Chen Zhen-Yu, LCA '98 Secretariat, POB 919 Beijing 100081, China, P.R. FAX: +86/10/381 6990

Control Engineering Practice Volume 4 Number 4, April 1996

Preview:

Control Engineering Practice
Application Paper Prizewinner - C. Waite

An Approach to Project Management in Computer-Aided Control Engineering
(H.A. Barker, P.W. Grant, I.T. Harvey, C.P. Jobling and P. Townsend)
Fuzzy Controller Synthesis for an Inverted Pendulum System
(S. Yurkovich and M. Widjaja)

Special Section on Intelligent Autonomous Vehicles (Guest Editor: A. Halme)

Preface to the Special Section on Intelligent Autonomous Vehicles
(A. Halme)
Vehicle Detection and Recognition in Greyscale Imagery
(N.D. Matthews, P.E. An, D. Charnley and C.J. Harris)

An All-Terrain Intelligent Autonomous Vehicle with Sensor-Fusion-Based Navigation Capabilities
(R. Jarvis)

Implementing and Testing a Reasoning-Based Free Gait Algorithm in the Six-Legged Walking Machine, "MECANT"
(S. Salmi and A. Halme)

Robots for Anti-Personnel Mine Search
(J.-D. Nicoud and P. Mächler)

Development of an Autonomous Navigation System for an Outdoor Vehicle
(K. Rintanen, H. Mäkelä, K. Koskinen, J. Pupitti, M. Sampo and M. Ojala)

Neural Speed Control for Autonomous Road Vehicles
(H. Fritz)

Mobile Robots for Planetary Exploration
(K. Schilling and C. Jungius)

Special Section on Advanced Motion Control (Guest Editor: A. De Carli)

Preface to the Special Section on Advanced Motion Control
(A. De Carli)

Robust Digital Tracking Controller Design for High-Speed Positioning System
(S. Endo, H. Kobayashi, C.J. Kempf, S. Kobayashi, M. Tomizuka and Y. Hori)

Auto-Tuning of Two-Degree-of-Freedom Motor Control of High-Accuracy Trajectory Motion
(T. Iwasaki, T. Sato, A. Morita and H. Maruyama)

Active Vibration Control of a 2-Mass System Using μ -Synthesis with a Descriptor Form Representation
(M. Hirata, K.Z. Liu and T. Mita)

Simultaneous Optimization of Positioning and Vibration Control Using a Time-Varying Frequency-Shaped Criterion Function
(S. Hara and K. Yoshida)

Zero Placements for Designing Discrete-Time Repetitive Controllers
(W.C. Messner and C.J. Kempf)

IFAC Meeting Papers - Keyword Listing

Modelling and Control of National and Regional Economies, July 1995, Queensland, Australia

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Control Engineering Practice Volume 4 Number 5, May 1996

Preview:

Scene Recognition and Navigation Capabilities for Lane Changes and Turns in Vision-Based Vehicles Guidance
(E.D. Dickmanns and N. Müller)

Stochastic Control for Wastewater Treatment Processes
(R. Tenno and P. Uronen)

Hybrid Kalman/Minimax Filtering in Phase-Locked Loops
(D. Simon and H. El-Sherief)

Weighting Function Selection in the H_∞ Design Process
(R.W. Beaven, M.T. Wright and D.R. Seaward)

Applications of Adaptive Filtering to Dynamic Weighting of Vehicles
(M. Niedzwiecki and A. Wasilewski)

Controller Design for an Overhead Crane System with Uncertainty
(Chi-Cheng Cheng and Cheng-Yi Chen)

Integrating Technical and Non-Technical Issues in Control Education
(D. Brandt, C. Imamichi, H. McGregor, I. Moses and R. van der Vorst)

Special Section on Adaptive Systems in Control and Signal Processing (Guest Editor Cs. Banyasz)

Preface to the Special Section on Adaptive Systems in Control and Signal Processing (ACASP '95)
(Cs. Banyasz)

Set Point and Identifiability in the Closed Loop with a Minimum-Variance Controller
(R. Gessing and M. Blachuta)

Template-Function-Based Estimators for Adaptive Control
(P.H. Thoa)

Frequency-Based Adaptive Control of Systems with Antiresonance Modes
(M. Berenguel and E.F. Camacho)

Combined Identification and Control: Another Way
(L. Keiviczky)

Design of a Multivariable State-Space Adaptive Controller, and its Application to a Turbo-Generator Pilot Plant
(Y.Y. Nazaruddin and H. Unbehauen)

Adaptive Compliant Control of Robot Manipulators
(B. Siciliano and L. Villani)

Adaptive Nonlinear Controller for a Current-Controlled Induction Motor
(J. Kabzinski, G. Wasiak and P. Wozniak)

An Adaptive Scheme with an Optimally Tuned PID Controller for a Large MSF Desalination Plant
(A. Woldai, D.M.K. Al-Gobaisi, R.W. Dunn, A. Kurdali and G.P. Rao)

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Control Applications of Optimization

10th IFAC Workshop

Haifa, Israel, 19 - 21 December, 1995

The Workshop was held in the building of the Faculty of Aerospace Engineering, Technion - Israel Institute of Technology in Haifa, the major city in Northern Israel, situated on the Mount Carmel and overlooking a beautiful bay of the Mediterranean Sea.

The objective of the Workshop was to bring together experts in control and optimization from research and industry to exchange ideas, discuss future developments in control applications of optimization and to create a genuine feedback loop between mathematicians, computer scientists, engineers and software developers that integrate theory, design, algorithms and implementation.

The Workshop was attended by 47 participants from 10 different countries. About half of the participants were from the Israeli control community. The second largest delegation consisted of 9 Russian scientists. At the Opening Ceremony, the participants were welcomed by Prof. A. Solan, Vice President of the Technion, and Prof. A. Feuer, the President of the Israel Association of Automatic Control.

Out of more than 60 submitted abstracts, 51 were accepted by the International Program Committee, chaired by F. Kirillova. The Final Program of the Workshop included 30 papers by authors who had preregistered by the 1 November 1995 deadline. This policy allowed to practically eliminate "no-shows" and guarantee a smooth working schedule (only one presentation had to be cancelled because of the absence of the author). A special session was reserved for those authors, who failed to preregister, but could attend the Workshop (4 such authors were accommodated). One of the 9 technical sessions of the Workshop was devoted to a Minisymposium (with 5 papers) on Trajectory Optimization organized and chaired by Prof. K.H. Well from the Institute of Flight Mechanics and Control, University of Stuttgart. The other sessions dealt with Optimal Control, Estimation and Identification, Games and Stochastic Control, Aerospace Control, Control Applications and Numerical Methods.

The scientific level of most of the presentations was exceptionally high and the audience was very active in asking questions and making comments.

Highlights at the Workshop were the Invited Plenary Lectures which started each of the three days of the Workshop:

1. A.B. Kurzhanski, Faculty of Computational Mathematics and Cybernetics, Moscow State University: Measurement Feedback Control under Uncertain Dynamics
2. K.H. Well, Institute of Flight Mechanics, University of Stuttgart: Optimization Based Guidance for Transatmospheric Vehicles
3. A. Yoffe, Faculty of Mathematics, Technion-Israel Institute of Technology: Necessary Conditions in Dynamic Optimization Problems Involving Differential Inclusions

On the second evening of the Workshop there was a reception banquet at the Canada Faculty Center of the Technion. The keynote speaker at the dinner was Prof. S. Merhav who spoke about "A Historical Review of Aerospace Control Activities in Israel".

The participants of the Workshop also visited the Philadelphia Flight Control Laboratory of the Faculty of Aerospace Engineering.

J. Shina, Chairman, NOC

Papers

Frequency Response of Sampled-Data Systems
(M. Araki, Y. Ito, T. Hagiwara)
Integral Constraints on Sensitivity Vectors for
Multivariable Linear Systems
(G. Gomez, G.C. Goodwin)
Optimal Strategies for the Control of a Train
(P. Howlett)
Cross-Directional Control on Paper Machines Using
Grain Polynomials
(K. Kristinsson, G.A. Dumont)
Performance Limitations of Adaptive Parameter
Estimation and System Identification Algorithms
in the Absence of Excitation
(K.A. Tsakalis)

Brief Papers

A Design Scheme of Variable Structure Adaptive
Control for Uncertain Dynamic Systems
(Chun-Bo Feng, Yu-Qiang Wu)
Input-Output Triangular Decoupling and Data
Sensitivity
(F.N. Koumboulis)
Optimal Guaranteed Cost Control of Uncertain
Systems via Static and Dynamic Output Feedback
(S.O.R. Moheimani, I.R. Petersen)
A Derivation of the Glover-Doyle Algorithms for
General H_{∞} Control Problems
(Jang-Lee Hong, Ching-Cheng Teng)
Stabilization of Nonlinear Systems Based on a
Generalized Bézout Identity
(A. Banos)
An Adaptive Predictive Regulator with Input
Saturation
(G. De Nicolao, R. Scattolini, G. Sala)
Model Validation for Robust Control of Uncertain
Systems with an Integral Quadratic Constraint
(A.V. Savkin, I.R. Petersen)
A Parameterization Approach to Disturbance
Decoupling Problem with Stability of Nonlinear
Systems
(Xiaohua Xia)
Robust Nonlinear Coordinated Control of Power
Systems
(Youyi Wang, D.J. Hill)
The Almost Disturbance Decoupling Problem with
Internal Stability for Linear Systems Subject to
Input Saturation-State Feedback Case
(Zongli Lin, A. Saberi, A.R. Teel)
Modular Approach to Adaptive Nonlinear
Stabilization
(M. Krstic, P.V. Kokotovic)
Identification of Dynamic Errors-in-Variables
Models
(P. Castaldi, U. Soverini)
Adaptive Fuzzy Modeling of Nonlinear Dynamical
Systems
(Shaohua Tan, Yi Yu)
A Hamilton-Jacobi Inequality Approach to the
Strict H_{∞} Control Problem of Nonlinear Systems
(Jun-Ichi Imura, T. Sugie, T. Yoshikawa)

Technical Communiques

Componentwise Stability of Continuous-time Delay
Linear Systems
(A. Hmamed)
Edge Property from Endpoints for Scattering
Hurwitz Polynomials
(N.K. Bose)

Book Reviews

Process Control Engineering, edited by M. Polke
(M. Thoma)
Advances in Dynamic Games and Applications,
edited by T. Basar and A. Haurie
(P. Bernhard)

Algorithms and Architectures for Real- Time Control (AARTC'95)

3rd IFAC/IFIP Workshop
Ostend, Belgium
31 May – 2 June, 1995

The third Workshop in this series, organised under the auspices of the IFAC AARTC Technical Committee, was held at the Thermal Hotel "Thermae Palace" at the Belgian seaside resort, Ostend. It was hosted by the Belgian Institute for Automatic Control (BIRA/IBRA), which is IFAC's national member organisation in Belgium.

Following the Call for Papers, some 165 abstracts were received from 30 countries, from which the IPC, after careful examination, selected 96 papers for presentation at the meeting. The Workshop was attended by 105 participants from 21 different countries. The large number of papers made it necessary to organise the sessions into three parallel streams, which offered the participants ample choice to attend interesting lectures, grouped into the following topics, all in the field of real-time control:

Intelligent control, robotics, software design, adaptive control, PLCs, scheduling, software packages, applications, multiprocessing, PID-control, traffic control & autonomous vehicles, hardware/architectures, fuzzy control, parallel algorithms, motor control, heterogeneous architectures, fault tolerant & dependable systems and industrial case studies.

The Keynote Lecture was given by Dr. Ken Hunt from Daimler-Benz AG (Berlin), who spoke about the interrelation between neural networks, traditional modelling methods and fuzzy systems. A very attentive audience learned that strands could be identified from these different approaches which led along a common path towards a more global view of the underlying paradigms.

The overall quality of the presentations was mostly very good, and it was not an easy task for IPC and NOC members to choose the most outstanding papers to propose for publication in Automatica or for a Special Section in Control Engineering Practice.

The IFAC Control Applications in Post-Harvest and Processing Technology (CAPPT'95) Workshop was held concurrently at the same venue and participants from both Workshops had the opportunity to come together during a splendid social dinner buffet at sunset along the Ostend beach, basking in soft June weather. This event was made possible only thanks to the sponsorship of some measurement and control manufacturers with international ambitions, who held a small but worthwhile exhibition at the Workshop location. Many of us will remember the singing led by IFAC's TC-members, proving that science and friendship go hand in hand within IFAC.

At the closing session, the IPC chairman warmly congratulated Luc Boullart and BIRA for an excellent venue and organisation on behalf of all the delegates. This Workshop proved a superb vehicle for the further promotion of AARTC interests within IFAC. For future activities, TC members agreed to establish a WWW page for AARTC within IFAC, planned special sessions for IFAC 96 in San Francisco and earmarked the Algarve as the venue for the next Workshop in 1997.

Prof. Peter Fleming
IPC-chairman

Prof. Luc Boullart
NOC chairman

Control Applications in Post-Harvest and Processing Technology – CAPPT'95 IFAC/CIGR/EURAGENG/ISHS Workshop

Ostend, Belgium, 1 – 2 June 1995

This first Workshop, organised under the auspices of IFAC was held at the Thermal Hotel "Thermae Palace" at the Belgian seaside resort, Ostend. Following the Call for Papers, some 100 abstracts were received from which the IPC, after careful examination, selected 45 papers for presentation at the meeting. It was very encouraging to see that for this topic a really broad international activity is carried out on a wide range of economically important subjects. Indeed many advanced methods which are normally expected to be first tested in hard-core industry are used here, such as neural and fuzzy control, NMR and infrared measurement methods, sensor fusion, quality control, and many advanced information processing techniques. The range of applications is also really wide, including, among others, processing and storage of all kinds of produce, fruit inspection, climate control, etc.

The international character of the meeting can be seen from the list of countries from which the authors came: Belgium (8), Japan (8), France (7), Germany (5), Poland (5), United Kingdom (5), The Netherlands (3), Hungary (3), Czech Republic (2), Spain (2), Latvia (1), Indonesia (1), Turkey (1), and USA (1). The Workshop was attended by 67 participants from 14 different countries. The large number of papers made it necessary to organise the sessions into two parallel streams. We had sessions on mathematical modelling and optimization, decision support and planning, measurement of properties of produce, computer controlled process environment, intelligent techniques in post-harvest operations, observation for control, and quality control. The papers were published by BIRA in Preprints of 292 pages.

The Keynote Lecture was given by Prof. G. van der Straten, Wageningen, The Netherlands who spoke about the position of automatic control solutions in the overall systems operations in the agricultural production as well as the post-harvest handling and processing of products. To achieve economically attractive solutions it is necessary to have suitable models describing product behavior as a function of environmental variables. To build these models new measurement methods for observing product conditions may be required. Once such models are available the concepts of optimal predictive control provide an attractive framework for profitable process operation and control. It is clear that the implementation of control solutions requires a close cooperation between bio-process engineers and control engineers. The topics presented at the workshop went along the line of this keynote lecture as they concerned both the process aspects and the control aspects in post-harvest handling of agricultural products. The overall quality of the presentations was perceived to be very good.

At the closing session, the IPC chairman on behalf of all the delegates warmly congratulated the authors for the excellent presentations and BIRA for an excellent venue and organisation. From this first workshop it is quite clear that the area is broad, active and important both in its scope and in its geographic spread. We look forward to the next versions of this workshop.

Prof. J. De Baerdemaeker, Chairman IPC
Prof. J. Vandewalle, Chairman NOC