1999 No. 5 October Newsletter

Contents:

CALL FOR PAPERS
Journal of Real-Time Systems
Special Issue on
Wireless Real-Time Communications

The advent of wireless computer communication facilities creates increasing interest in utilizing this technology for real-time computer communication. Among the promising prospects are seamless support of mobile nodes, e.g. in factory automation systems, increased fault-tolerance based upon multiple radio channels, and superior scalability. However, particular challenges are created if wireless communication is to be used in a real-time system.

The above mentioned special issue of Real-Time Systems focuses on this problem domain. You are invited to submit original theoretical and applied/practical papers that deal with wireless

    Algorithms and services
    Protocols
    Robust communications
    Hardware architectures
    Physical layer advances
    Applications and case studies

related to

    Real-time communication
    Reliability and fault-tolerance
    Advanced security issues

Please email your contributions (in postscript format) before December 1, 1999.

Prospective authors may download a PostScript version of the complete call for papers from

http://www.cs.ucsd.edu/~cfetzer/cfpwrtc.ps

14th IFAC World Congress
Beijing, China, P.R.
Report of the IPC Chair

1. Summary

The 14th IFAC World Congress was held in the International Convention Center, Beijing, P. R. of China, July 5-9, 1999. It had 1466 registered participants, including 1080 from outside the Chinese Mainland, and 300 accompanying persons. Control scientists and engineers from 59 countries and regions demonstrated their achievements and shared their experience in research and applications in the broad areas of automatic control.

In the course of five Congress days, 1366 papers were presented in 215 lecture sessions and 46 poster sessions. Each Congress day started with a plenary talk given by control experts of international reputation. Seven Panel Discussions were organized on topics such as Perspectives on Control, Control Challenge in the 21st Century and others. Before the Congress, on July 4, 1999, seven tutorial workshops were organized. IFAC'99 being the first IFAC World Congress taking place in a developing country, was considered to be a great success by the international control community.

2. Paper Submission and Acceptance

The IPC Secretariat received 2169 submissions from 68 countries and regions including 6 survey papers, 1842 contributed papers, 3 case studies and 318 papers divided over 53 invited session proposals. There were proposals for 8 panel discussion.

By the end of June 1998 all submitted papers were packaged according to their subject areas and sent to the 45 IFAC TC Chairs for review. Each paper required at least two reviews. For several TCs, the numbers of submitted papers were more than 150, for example, 201 papers for the TC on Nonlinear Systems, 169 papers for the TC on Robust Control and 162 papers for the TC on Modeling, Identification and Signal Processing. To organize the review for so many papers was a big burden for TC Chairs. I feel very much indebted to all reviewers, TC Chairs and CC Chairs for their hard work.

Based on the reviews, the TC Chairs arranged the accepted papers in sessions and sent their reports to the corresponding CC Chairs, who took the final decision on acceptance/rejection of papers and reported the session arrangements of their CC to the IPC Secretariat. The paper review was thus carried out in a decentralized way and the IPC Secretariat including the IPC Chair made no change in the decisions of CC Chairs.

As a result of the review process 1556 papers from 59 countries and regions were accepted for presentation at the Congress. About 20% of the accepted papers came from the Chinese Mainland. The number of papers included in the Final Program of IFAC'99 was less than the accepted papers by 13, i.e. 1543.

The following statistics show the distribution of accepted papers in decreasing order over subject areas. There were 482 papers on "Design Methods", 309 on "Systems and Signals", 239 on "Industrial Applications", 174 on "Manufacturing and Instrumentation", 105 on "Systems Engineering and Management", 99 on "Transportation and Vehicles", 56 on "Computer Control", 50 on "Life Support Systems" and 42 papers on "Global and Educational Issues of Automation". All these papers were scheduled in 46 Poster Sessions and 215 Lecture Sessions arranged in 17 parallel tracks.

There were eight countries with more than 50 accepted papers. The statistics are listed in Section 5.

3. Some Observations

At the Congress there were many successful sessions including 6 sessions on industrial applications and process control, 3 sessions on robust and nonlinear control. Each of these sessions had more than 60 attendees. The Session "Systems with Delay" attracted more than 80 attendees.

The Panel Discussions "Perspectives on Control" and "Control Challenge to the 21st Century" were very successful with more than 250 and 150 attendees respectively.

The poster type of presenting papers provides an even better opportunity to communicate with the audience and hence has its own advantage over the oral presentation. This explains why the poster sessions of the Congress attracted so many people involved them in animated discussions.

At the Congress about 51% of the presented papers fell into the theory-oriented CC on Design Methods and CC on Systems and Signals. Automatic control is a science of engineering and technology, and hence the vitality of control theory consists in its applications. Thus, narrowing the gap between theory and practice is a challenge to control scientists in the coming new century.

The real-world problems are often very complicated; they may be not only nonlinear, but also with random disturbances and with model uncertainties, sometimes even infinite-dimensional. Therefore, the second challenge to control scientists is to develop not too complicated theories that can deal with complex control systems.

4. Congress Paper Prizes

There are three Congress paper prizes: the Application Paper Prize and the Young Author Prize are funded by IFAC, while the Poster Paper Prize was funded by the Chinese NMO.

For the Poster Paper Prize there were 13 papers as Finalists and the winners were the following two papers:

"A Novel Qualitative Control Method to Inverted Pendulum Systems"
by Deli LI, Hui CHEN, Jianhua FAN and C. Z. SHEN and
"Robust and Optimal Fuzzy Control: A Linear Matrix Inequality Approach" by Kazuo TANAKA, Tadanari TANIGUCHI and H. O. WANG.

5. No-Show Author Problem

1543 papers (1266 lecture papers and 277 poster papers) have been included in the Final Program, but only 1366 papers (1143 lecture papers and 223 poster papers) were presented at the Congress. The difference is 177 papers. For simplicity we can say that not all of these papers fall into the category of no-show author papers, as the authors of about 10 of them apologized in advance for not being able to present their papers at IFAC'99. The ratio of no-show author papers to accepted papers is 11.47% for the whole Congress. To be precise, 9.72% for lecture papers and 19.49% for poster papers. The following statistics show the no-show author paper rates for those countries, which have more than 50 accepted papers each.

Country or region	number of accepted papers	number of no-show author papers	ratio of no-show author papers
Chinese Mainland	312	29	9.29%
USA	173	29	16.76%
Japan	146	4	2.74%
France	94	8	8.51%
UK	90	13	14.44%
Germany	82	3	3.66%
Sweden	52	0	0.00%
Italy	51	5	9.80%

The distributions of accepted papers and no-show author papers over other countries and regions with more than 4 accepted papers are as follows.

Country or region	no of acc. papers	no of no-show author papers
Canada	46	8
Australia	43	5
Spain	40	1
Hong Kong, China	38	6
Singapore	36	2
Korea	35	3
Russia	35	16
Brazil	22	4
Taiwan, China	18	1
Poland	17	1
The Netherlands	17	0
Finland	16	0
Mexico	16	1
Czech	15	1

Country or region	no of acc. papers	no of no-show author papers
Hungary	11	1
Portugal	10	0
Austria	9	0
Belgium	9	0
Denmark	9	1
Switzerland	9	1
Ukraine	9	6
Greece	8	1
Norway	8	2
South Africa	8	2
New Zealand	7	2
Slovenia	7	0
Macedonia	6	4
Romania	6	4

The number of accepted papers that are not counted in the above tables is 46, which are distributed over 23 countries. Among them 13 papers were not presented at the Congress.

The no-show author problem perplexes the organizers of all kinds of conferences. It is usually assumed that this problem is connected with economy, and it is believed that with the development of the global economy, in which automatic control may play an important role, the no-show author problem will gradually be solved. However, from the above statistics it is seen that the system with the no-show author paper rate as its output is complicated, and the economy is not the unique input. Maybe, it is of interest for IFAC NMOs to consider the system of no-show author rate in order to decrease its output. This is a challenge to IFAC NMOs. I fell embarrassed to recognize that the no-show author rate is 9.29% for the Chinese Mainland. The Chinese NMO, i.e. the Chinese Association of Automation, will seriously consider the problem.

6. Acknowledgment

The Final Program of the 14th IFAC World Congress is the result of collective work of hundreds of reviewers, 45 IFAC TC Chairs, 9 IFAC CC Chairs and all IPC Members. It is also the result of hard work of the IPC Secretariat during almost 3 years

and the close cooperation between both Secretariats of IPC and NOC in coordination with the China International Conference Center for Science and Technology. Their contribution to the Congress is highly appreciated.

Finally, I would like to thank all our colleagues and friends from different parts of the world who have given support, help and useful suggestions without which the success of the Congress would have been unimaginable.

H.F. Chen, IPC Chair
14th IFAC World Congress

For the Young Author Prize there were 5 papers in the Finalists and the winner was
"H-Infinity Control, Stabilization and Input-Output Stability of Nonlinear Systems Based on Homogeneous Techniques" by Yiguang HONG.

For the Application Paper Prize there also were 5 papers in the Finalists and the winner was
"Mixed μ Analysis for Flexible Systems (I and II)" by J. F. MAGNI, C. DOLL, C. CHIAPPA, B. FRAPARD and B. GIROUART.

Major Medals Awarded

On the occasion of the 14th IFAC World Congress in Beijing, many awards were presented. The most prestigious among them are the Giorgio Quazza Medal and the Nathaniel Nichols Medal.

The **Giorgio Quazza Medal** is an IFAC Award to a distinguished control engineer presented at each Triennial IFAC World Congress as a memorial to the late Giorgio Quazza. Previous winners have been:

|		
Prof. John F. Coales	–	1981
Prof. Yakov Z. Tsypkin	–	1984
Prof. Karl J. Aström	–	1987
Prof. Petar Kokotovic	–	1990
Prof. Edward J. Davison	–	1993
Prof. Alberto Isidori	–	1996

At the Opening Ceremony of the 14th IFAC World Congress in Beijing, PRC, the Giorgio Quazza Medal was awarded to **Prof. Brian D.O. Anderson** for his longstanding technical contributions in Control Theory across a range of fields including Adaptive Control, System Identification, Kalman Filtering and for his exemplary leadership as IFAC President, Technical Board Chair and Automatica Editor.

The **Nathaniel Nichols Medal** recognizes outstanding contributions of an individual to design methods, software tools and instrumentation, or to significant projects resulting in major applications and advancement of control education. The spirit is captured by the name of Nathaniel Nichols, one of the pioneers of control engineering. The first previous medal winner was:

Prof. Jürgen Ackermann – 1996

At the Opening Ceremony of the 14th IFAC World Congress in Beijing, PRC, the Nathaniel Nichols Medal was awarded to **Dr. Gunther Stein** for his contributions to the theory and practice of automatic control in the aerospace industry.

Gunter Stein
Winner of the
Nathaniel Nichols Medal 1999
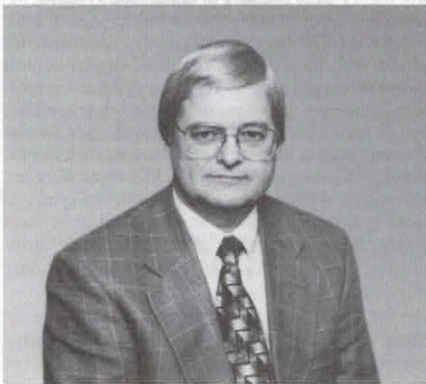
Gunter Stein

Dr. Stein is chief scientist of Honeywell's Technology Center in Minneapolis, MN. This center conducts research and development activities in sensors, navigation and control systems, computer systems and software, information processing and displays, and crew interfaces.

Dr. Stein's own technical specialization is in systems and control. He has managed R&D programs and served as an individual contributor in this technology area since joining Honeywell as a research engineer in 1969. He has extensive experience in aircraft flight controls (fighters, transports and experimental vehicles), in spacecraft attitude and orbit controls, and in navigation systems for strategic, tactical and commercial applications. He has also conducted control design and technology studies for large space structures, launch boosters, maneuvering reentry vehicles, ship positioning systems, torpedo engines and autopilots, and for precision guided weapons.

From 1977 to 1997, Dr. Stein also served as Adjunct Professor in Electrical Engineering and Computer Science at the Massachusetts Institute of Technology, Cambridge, MA, teaching control system theory and design.

Dr. Stein's research interests include multivariable control, estimation, filtering, and adaptation, with emphasis on applications to complex aerospace problems. He has been instrumental in bridging the considerable gap between the modern state space control theory of the 60's and the earlier classical

Brian D.O. Anderson
Winner of the
Giorgio Quazza Medal 1999

Brian D.O. Anderson, Yong-Zai Lu

Brian Anderson is a prolific author of technical articles and books. He has contributed to an exceptionally wide range of Control Theory, and his citations indicate the novelty and impact of his work across (and outside) the discipline. Coupled with his outstanding ability to identify, pose and solve technical problems of great significance, he has been a central figure in the management of research, research communication, technology transfer and education. It is indeed rare to find his mix of research excellence, business acumen and community spirit in an individual. He has achieved extraordinary things in each of these areas.

While it is important to recognize that Brian Anderson has received the Quazza Medal for his outstanding scientific achievements, it may well be stated without exaggerating that he also has a stunning record of service to IFAC. Brian Anderson has been associated with IFAC as a senior figure for over 25 years, as Associate Editor and then Editor of Automatica, Chair of the Technical Board, President Elect and member of the Executive Board, President of IFAC, Past President and Advisor.

But as the Quazza Medal is awarded for scientific achievements, the following will concentrate on his technical contributions and, for reasons of space, will focus on just a few special highlights.

Kalman Filtering and Optimal Control – his most heavily cited published work is his book with John Moore, Optimal Filtering. This book has been the central reference work and entry point to Kalman Filtering for many researchers in the Automatic Control Field and elsewhere. With John Moore as co-author, Brian Anderson has published a trio of books in the Linear Optimal Systems area, which have become benchmarks for their scientific content and style.

Adaptive Control – Brian Anderson's name is indelibly linked with the introduction and explanation of the concept of Persistence of Excitation. He has won prizes from the Signal Processing Community for his development and application of stability techniques for adaptive systems.

His work in Adaptive Control has included significant contributions in the related area of Systems Identification and on-line modelling and control design. He is largely responsible for introducing the concepts of averaging to the adaptive field. His ideas in relaxing previously very strict requirements for the stability of such methods have served to tie the theory to much more practically applicable areas.

Robust Control Design - His contributions to this field, typically, range across several sub-fields. Notably he has developed new methods for interval polynomial stability tests (known as Kharitonov problems) and extended these to discrete-time and alternative set parametrizations. His contributions to H infinite robust control design have been on many fronts including connections to spectral factorization, game theoretic approaches, the relation to quadratic optimal control and multi-objective margin optimization.

frequency domain concepts of the 40's, culminating in a synthesis now generally known as robust multivariable control. Dr. Stein is also active in the development of computer aids for control system design.

Dr. Stein is a member of the IEEE, the AIAA, and Sigma Xi. He received Honeywell's H.W. Sweatt Award for engineering excellence in 1972, was named Minnesota's "Young Aerospace Engineer of the Year" in 1975, was elected fellow of the IEEE in 1985, was awarded the IEEE Control System Society's first Hendrick W. Bode Prize in 1989, and was elected to the National Academy of Engineering in 1994.

Papers from the November 1999 Issue

Survey Paper

Set Invariance in Control – A Survey
(F. Blanchini)

Paper

Image-enhanced Multiple Model Tracking
(J.S. Evans, R. J. Evans)

Brief Papers

Multivariable Generalized State-space Receding
Horizon Control in a Real-time Environment
(A. Gambier, H. Unbehauen)
Average Cost Temporal-difference Learning
(J.N. Tsitsiklis, B. Van Roy)
Design and Performance Analysis of a Direct
Adaptive Controller for Nonlinear Systems
(T. Zhang, S.S. Ge, C.C. Hang)
Optimal Production with Preemption to Meet
Stochastic Demand
(J.B.R. Do Val, J.L.F. Salles)
Robust Fault Detection Based on Observers for
Bilinear Systems
(M. Kinneart)

Technical Communiques

On the Frequency Response of Scalar Discrete-time
Systems
(B.A. Léon de la Barra, R. Prieto)
Diagonal Balanced Truncation of Discrete Delay
Systems
(Young Soo Suh)
Robust Stabilization of Uncertain Input-delay
Systems by Sliding Mode Control with Delay
Compensation
(Young-Hoon Roh, Jun-Ho Oh)
Gradient Expressions for Closed-loop Identification
Scheme with a Tailor-made Parametrization
(F. de Bruyne, B.D.O. Anderson, M. Gevers,
N. Linard)
Decentralized Adaptive Control of Linear
Interconnected Systems Based on Laguerre Series
Representation
(M. El Adel, M. Madoudi, L. Radouane)

Book Reviews

Adaptive Systems - An Introduction, by I. Mareels
and J.W. Polderman
(Gang Tao)
A Theory of Learning and Generalization, by
M. Vidyasagar
(R. Meir)

Papers from the December 1999 Issue

Editorials

Special Issue on Control Methods for
Communication Networks - Introduction
(V. Anantharam, J. Walrand)
Mituhiko Araki succeeds Editor Katsuhisa Furuta
(H. Kwakernaak)

Special Section

Signal Compression by Subband Coding
(B. Francis, S. Dasgupta)
On the Speedup Required for Combined Input- and
Output-queued Switching
(B. Prabhakar, N. McKeown)
Congestion Control in High-speed Communication
Networks Using the Smith Principle
(S. Mascolo)

Congestion Control as a Stochastic Control
Problems with Action Delays
(E. Altman, T. Basar, R. Srikant)
Class-specific Quality of Service Guarantees in
Multimedia Communication Networks
(I.Ch Paschalidid)
Resource Pricing and the Evolution of Congestion
Control
(R.J. Gibbens, F.P. Kelly)
Power Control and Capacity of Spread Spectrum
Wireless Networks
(S.V. Hanly, D.N. Tse)
Information Delivery Through Broadcasting in
Satellite Communication Networks
(L. Tassiulas, Chi Jiun Su)

Real Time Programming
24th IFAC/IFIP Workshop
Schloss Dagstuhl, Germany
31 May – 2 June 1999

With its long tradition dating back to 1971, this year
the IFAC/IFIP Workshop on Real Time Program-
ming (WRTP) joined forces with the International
Workshop on Active and Real-Time Database
Systems(ARTDB). Both series of workshops have
established themselves as excellent platforms for
the exchange of information on recent technologi-
cal advances and practices in real time computing,
a field that is becoming an essential enabling disci-
pline of both control engineering and computer
science and engineering as there is an accelerated
growth of demands for functionality and depend-
ability of real time and embedded control systems.

The Joint Workshop provided an opportunity to
assess the state of the art, to present new results,
and to discuss possible lines of future developments.
Primarily, it focused on software development for
real time systems, various aspects of real time
operating systems and active and real time database
systems. The now annual Workshop on Real Time
Programming and the biennial Workshop on Active
and Real-Time Database Systems will co-operate
again in two years.

The technical program of this 1999 Joint Workshop
maintained the outstanding quality of both series.
It covered latest research and developments in
requirements engineering, software engineering,
active and real time database systems, communica-
tion and clock synchronisation, embedded systems,
formal methods, operating systems and scheduling.
There were 58 paper submissions from 19
countries. The contributions came from Europe,
North America, Australia, and the Far East. Each
paper was reviewed by at least three referees, who
gave marks. The highest scoring 26 papers were
selected for acceptance and assigned to be presented
in 8 sessions, further 8 submissions where selected
as reserve papers to be presented in case there were
no-show authors. Of these 34 papers accepted for
publication 29 were from academia, 4 from indus-
try, and 1 from a government research agency. In
addition to these high quality technical papers, the
program also featured a keynote address delivered
by Prof. J. Zalewski, and a panel discussion on the
state of the art in the field of active real time data-
base systems.

The Workshop was jointly organised by the Tech-
nical Committee on Real Time Systems of the Ger-
man IFAC and IFIP NMOs, the University of
Skovde, FernUniversitaet Hagen and Schloss
Dagstuhl.

The generous support of the Workshop by grants
of the University of Skovde in Sweden and by
Deutsche Forschungsgemeinschaft enabling the
participation of overseas and Central European
scientists is highly appreciated.

Alceu Heinke Frigeri, Wolfgang A. Halang and
Sang H. Son,
Conference and IPC Chairmen of WRTP'99 and
ARTDB-99

WHO IS WHO IN IFAC
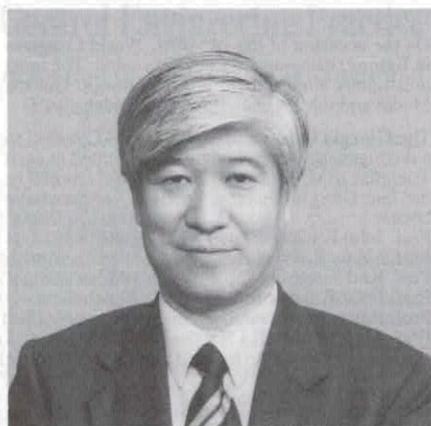
M. Araki

Prof. Mituhiko Araki received the B.E., M.E., and
Ph.D. degrees, all in electronic engineering, from
Kyoto University, Kyoto, Japan, in 1966, 1968, and
1971, respectively. Since 1971 he has been with
the Department of Electrical Engineering, Kyoto
University, where he is currently a Professor. He
visited Imperial College, London from 1973 to
1975, Santa Clara University, California in 1979,
and Waterloo University, Ontario in 1982.

He started his research career by joining a medical
electronics group, where he was engaged in a simu-
lation study of a neural network model (Perceptron)
as well as an experimental study of a real neural
system of cats. As a topic of Master Thesis, he chose
analysis of a certain class of stochastic systems
which appeared in medical applications. Then, he
was inclined towards theoretical worlds and was
mainly engaged in studies of systems and control
theory for 25 years.

The topics of his interests in the systems and con-
trol theory were stability of composite systems, M-
matrices, Nyquist array method for design of mul-
tivariable controllers, state predictive controllers for
plants with pure delays, multirate digital control
systems, two-degree-of-freedom optimal control-
lers, frequency responses of sampled-date systems,
etc. In parallel to the theoretical researches, he was
also engaged in industrial applications such as pro-
posal of two-degree-of-freedom PID controllers and
their optimal parameter tuning, control of synchro-
nous generators, control and scheduling of steel
producing systems, scheduling of elevators, intro-
duction of the "quasi-state" concept to scheduling
problems, etc.

Since 1991, he has been engaged in co-operative
researches with medical doctors; such as control of
blood pressure of patients under surgery, control of
blood sugar after surgery, control of intraocular
pressure during eye surgery, clinical stage classifi-
cation, etc. Currently, he is placing more time and
efforts on these medical applications, while he is
still much interested in industrial applications of
control theory and scheduling techniques.

He is a member of IEEE and of many Japanese
academic societies. He was an associate editor of
the IEEE Transactions of Automatic Control and
the editor-in-chief of Systems, Control and Infor-
mation (a Japanese Journal). He is currently the
editor-in-chief of the Transactions of the Society
of Instrument and Control Engineers in Japan.

At the General Assembly held in the framework of
the 1999 IFAC World Congress in Beijing, he was
elected member of the IFAC Council. He was also
appointed Editor of the IFAC Journal Automatica
to succeed Prof. Katsuhisa Furuta.