IFAC International Federation of Automatic Control
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Newsletter

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Season's Greetings

IFAC'96: A CHALLENGE TO THE INTERNATIONAL CONTROL SYSTEMS COMMUNITY

Excerpts from the Keynote Address, given by John Slaughter* at the Opening Ceremony of the 13th IFAC World Congress, June 30, 1996

It is a distinct honor for me to be among those welcoming you to this 13th World Congress meeting of the International Federation of Automatic Control. It is a personal pleasure to join my old friends, Steve Kahne and Harold Sorenson. I owe a special debt of gratitude to Harold who served as my mentor more than twenty-five years ago at the University of California, San Diego.

Back in the days when I did useful work, I thought of myself as a control systems engineer. While I never scaled the heights of those who have played leading roles in IFAC – so fascinatingly described in the historical account written by Steve Kahne – I did participate in sessions of the Joint Automatic Control Conference meetings of the 1960's, published a few papers, and was a card-carrying member of the IEEE Control Systems Society. But like former New York Yankee Yogi Berra once advised, 'When you come to a fork in the road, take it.' I came to such a junction in the mid-70's and have traveled, since then, as a scientific and higher-education administrator, ... a bureaucrat.

However, I have not lost total contact with what is occurring in 'your' field nor have I lost interest in what is being pursued and accomplished in the research and development centers throughout the world. I continue to be proud of my own humble origins as a control systems engineer.

Thirty-one years ago this summer, I had the privilege of heading a small team of engineers, computer scientists and technicians who conducted one of the earliest demonstrations of the use of a stored-program, general-purpose digital computer as a controller in a closed-loop digital control system, if not the first. The computer, a U.S. Navy AN/USQ-20 machine with 32,768 words of memory and a 1 microsecond memory access time, which we programmed in machine language, was used to control a large, shipboard-mounted, electro-hydraulic, tactical-missile launcher. We employed the theory and techniques of John R. Ragazzini, Gene Franklin, E. I. Jury, Julius Tou, and others, who were writing texts and papers about sampled-data control systems theory but who did not, at that time, have access to the computers to carry out tests of their research. You can imagine the thrill I felt that massive launcher responded smoothly to computer control with commands provided at a 10 samples/second rate. The results of the work demonstrated, to me at least, that digital closed-loop control could be made practical.

Today, computers with many orders of magnitude more speed and power and many orders of magnitude less weight and volume are ubiquitous and are performing tasks unenvisioned in 1965. Computer hardware and software developments dazzle us with their professed capabilities but to date it remains difficult to see whether computer technology has fulfilled the promises of the increased productivity that we seek. We have learned how to develop applications that replace human activity but the large multiplier effect on human productivity has yet to be realized. This reality, in my opinion, is what makes the community of control systems engineers so important to the future. Just as education is too important to be left solely in the hands of educators, computer applications are too important to be left solely to computer designers. The issues facing our global society are monumental ones. The problems we encounter in sustainable development, environmental protection, food production, transportation, health care, communications, energy and power, and many others that require the use of state-of-the-art computer equipment and systems demand the best thinking and work of our world's control system researchers and designers. Applications that draw upon the enormous potential embedded in the hardware and software being delivered by computer manufacturers throughout the world are best developed by those who understand the fundamental truths of control theory and practice. We need fewer applications whose worth is measured by the number of persons they replace and more applications that can be measured by the improvement they make to the quality of our lives. Simply automating human operations is not enough; providing value through the intelligent and ethical use of systems that enhance the synergies between humans and machines must be our higher goal. In short, our performance indices must be changed.

Our world is becoming increasingly populated by concepts and technologies with names like 'client/server,' distributed networks, graphical user interfaces, relational databases, interprocess communications, and the like. It remains unclear whether or not these ideas and developments will truly be used to improve the health, education, security and comfort of all people or whether they will only deepen the chasm between the haves and the have-nots. The answer lies in the utility we fashion from them, the task that confronts each of us.

As an educator I am increasingly concerned about the tensions, fears and uncertainties that afflict too much of the world's populace – especially young persons. Starvation, ignorance, pollution, crime, ethnic and racial conflict are too omnipresent for us to feel that our grand accomplishments in research and technology are being used for the best purposes.

When the late African-American chemist Percy Lavon Julian, received an honor scroll from the American Institute of Chemists, he chose to quote, in his acceptance speech, from a poem of Henry Wadsworth Longfellow which begins: Where should the scholar live? In solitude or in society?

As both chemist and humanist, Dr. Julian's answer was: in society. 'My prime concern,' he said, 'is that the scientist . . . recognizes the magnitude of responsibility resting upon his shoulders, when the nation entrusts so much of its wealth in his hands.'

Today, we are confronted on a regular basis with tremendous advances in science and technology that continue to reshape our society. From the space

shuttle to the personal computer, technological advances are constantly before us. Discoveries made in our research laboratories are reaching the public more quickly than ever before. There used to be an average of two decades between the making of a scientific discovery and its application in the marketplace. But recently, especially in fields such as microelectronics and biochemistry, that span has been telescoped into as little as two years.

I find it sobering to realize that in the slightly more than forty years since Watson and Crick unlocked the secrets of DNA and in the nearly fifty years since Brattain, Bardeen and Shockley discovered the transistor, our lives have been irreversibly transformed. Today we have the ability to synthesize insulin, produce interferon, grow disease-resistant plants and grow hogs that have less fat using animal growth hormones such as porcine sonatocropin. We have supermarkets full of CB's, CD's, PC's, TV's, and VCR's as a result of the explosion in microelectronics. All of these applications, and many more, are the products of the feverish activity that has occurred globally in research and technology.

While we cherish the pleasure, comfort and improved health that we receive from these innovations-, which are rapidly becoming necessities – we must stop and reflect on their total impact on our standard of living now and in the future. We must recognize that there are potential conflicts between science and society and that there is a need for an appreciation of social consciousness in science and technology. Unfortunately, but understandably, solutions to these conflicts will not be found in courses in science and technology. Answers to them require an exposure to, an appreciation for, and an immersion in the study of moral thought and human values. Without this understanding, the scientist or engineer is but an amoral machine that dispassionately and mechanically crunches numbers and grinds out answers. But an effective scientist or engineer, a socially responsible scientist or engineer, is a person who has this appreciation.

In order for the enormous advances in science that we will see in this decade to be used for the betterment of humankind, we must hail experts who understand the social and ethical consequences of their research. Many scientists and engineers find their source for this in religion. They obtain guidance from Martin Luther King, Jr., who said that 'Science deals mainly with facts; religion deals mainly with values.' And they receive even more solace from the words of Albert Einstein, the quintessential scientist, who remarked that 'Science without religion is lame; religion without science is blind.' Whether it comes from religion or some other source of ethical or moral values, the scientist who cannot make value judgments, who cannot see beyond the facts, is of limited use and may even be a threat to society. We must not let the emerging scientific developments and technologies in our laboratories and testing facilities hypnotize us to the point where we fail to consider the moral and social consequences of our advances.

In 1869, the great American educator, Charles William Eliot, noted in his inaugural address as president of Harvard University that the university 'recognizes no real antagonism between literature and science and consents to no such narrow alternatives as mathematics or classics, science or metaphysics. We would have them all,' he said,' and at their best.'

I like that view and, in my own opinion, we in education have our work cut out for us. As an engineer and now head of a liberal arts college, I believe that we must ensure that our students are well versed in the fundamentals of literacy and numeracy. We find that often we need to assist them in the development of manners as well as mathematics, compassion as well as composition, civility as well as the history of civilization, accountability as well as accounting and tolerance as well as topology. We need to help them make the connections between the arts, the humanities and the sciences. They need to study both Milton and molecules, both Carlyle and calculus, both Bach and botany, both Picasso and picofarads, both Giovanni and geometry, both Michelangelo and microcomputers, both Isaiah and isotopes. They need to understand the insight of Percy Lavon Julian, about whom I spoke earlier, who said of the sciences and the humanities, 'The goal of both is to enrich and ennoble the good life of man.'

James Botkin, co-author of the book Global Stakes: The Future of High Technologv in America, said in a U.S. News and World Report interview that 'There needs to be a rethinking of the social sciences and humanities in the general education of college students to ensure that they have both technological training and grounding in values and ethics. If they do not have both,' he said, 'we could wind up with either technological illiteracy or a technocracy.'

We are agreed that the questions that need answers – the ones that influence policy makers and opinion makers – must be based upon solid science and not just on human concern. But scientists and engineers are becoming well aware that they alone can't give the answers to the question, 'What are we going to do with the knowledge we gain?'

Clearly, science, technology, ethics and public policy meet in the environmental sciences, in energy and natural resources issues, in defense R&D and a host more areas – sometimes where it is least expected. In all of these areas control systems theorists and designers have major roles to play.

It is time and it is imperative, I believe, for the scientists and the engineers of the world to join the battle with the enthusiasm and the imagination for which they are noted. It is time for the creativity and the energy of our superlative scientific and technological communities to be brought to bear on the problems and dilemmas that face our society. It is time to transform the reality that scientific knowledge doubles every thirteen years and computer power doubles every eighteen months into the creation of a safer, saner, cleaner world for our children to inhabit. We need to ensure that every individual has an opportunity to be a productive participant in a global society in which virtual reality and inter-active imaging will have the capacity to shape our perception of the world in which we live. Now is the time for the scientific and technological community to stop receding into our laboratories to clone genes, invert matrices and synthesize compounds while pretending that the rest of the world does not exist.

Science, Percy Lavon Julian noted, is more than methodologies, symbolisms, and technological devices. It is vastly more than the creation of mere things; computer and mechanical robots are only incidental by-products of its spirit of inquiry. He went on to state that, in his opinion, the mission of scientists and engineers is to give their energies toward creative imagination in the world of ideas concerning mankind and human destiny. It is this kind of thinking we need today. It is time for us all to get involved.

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* John Brooks Slaughter was born in Topeka, Kansas, and spent his formative years in that state. He began his collegiate training at Washburn University in Topeka as a Whiting Scholar and completed his baccalaureate in electrical engineering at Kansas State University in 1956. Starting his career as an electrical engineer he then continued to complete an M.S. in engineering at the University of California (Los Angeles) and a Ph.D. in Engineering Science at the University of California (San Diego). Although Dr. Slaughter began his career as an electronics engineer in industry and then in government, he has always been part of the academic community. His research specialty is in the field of digital control systems theory and applications. His accomplishments have brought him special recognition such as honorary degrees from a large number of distinguished universities. Among others Dr. Slaughter is a Fellow of the Institute of Electrical and Electronic Engineers. In addition to the distinguished positions he has held throughout his career, he has served the public in many other ways. Concerned with education, he has also been active in national efforts to involve minorities in science and engineering.

The Automatica and Editor-in-Chief's World Wide Web Sites

For the benefit of our customers, Automatica's publisher Elsevier Science maintains Internet sites in Europe (www.elsevier.nl) and the USA (www.elsevier.com) as well as an ftp site (ftp.elsevier.nl). The sites provide useful and important information about the Elsevier Science journals and other publications. Also, Automatica has a home page (www.elsevier.nl/locate/automatica) which has been 'live' for almost two years.

Consult it when you are looking for:

- Automatica's aims and scope;
- editors' contact information;
- instructions for authors;
- abstracting and indexing information;
- a list with links to related publications, such as Control Engineering Practice;
- bibliographic information (ISSN number, subscription prices and order form);
- a sample copy request form; and
- information on Elsevier's Content Direct service.

There also is a guest book.

Recently, a separate site was established for the Editor-in-Chief's home page (www.math.utwente.nl/eic). It is of course linked to the Automatica home page. Besides a welcome message, links to the Automatica home page and the IFAC and Elsevier sites, these services are offered:

- An up-to-date list of papers that have been accepted for publication and will appear in future issues of Automatica.
- The full texts of recent and advance editorials.
- Access to an up-to-date database of the cumulative table of contents of Automatica starting with Volume 1 (1965), which may be searched by specifying 1-5 search strings.
- An Editor's gallery with photographs, full addresses and information about the Automatica Editors.
- Instruction for the preparation and submission of papers.
- Information about the preparation of final versions of papers as LaTeX documents and links to the Elsevier ftp site for downloading the Elsevier elsart LaTeX style files and guidelines for authors.

The Editor-in-Chief's site will play an important role in an experiment with the electronic submission of papers that Automatica will soon initiate. The details will be announced in a later editorial.

Huibert Kwakernaak
Editor-in-Chief, Automatica

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(Yan Dong and Zhang Hongyue)

IFAC Meeting Papers – Keyword Listing

Control of Power Plants and Power Systems, December 1995, Cancun, Mexico
Experience with the Management of Software Projects, September 1995, Karlsruhe, Germany
System Structure and Control, July 1995, Nantes, France
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IFAC Symposium AI in Real-Time Control – AIRTC 97	Sept. 23 - 25	Kuala Lumpur Malaysia	1 Dec. 1996	Dr. Marzuki Bin Khalid B.A.T.C., Universiti Teknologi Jalan Semarak, 54100 Kuala Lumpur, Malaysia FAX +603/2911294 e-mail: marzuki@batcserv.batc.utm.my
IFAC/(ISHS) Workshop (3rd) Mathematical and Control Applications in Agriculture and Horticulture	Sept. 28 - Oct. 2	Hannover Germany	31 Dec. 1996	VDI-VDE GMA POB 10 11 39, D-40002 Düsseldorf, Germany FAX+ 49/211/6214-161
IFAC Conference System Structure and Control	Oct. 23 - 25	Bucharest Romania	1 June 1997	Prof. Dumitru Popescu Splaiul Independentei 313 Bucharest 6, Romania e-mail: dpopescu@indinf.pub.ro

Newly Approved Events

IFAC Symposium (14th) Automatic Control in Aerospace	Aug. 24 - 28 1998	Seoul Korea	15 Oct. 1997	Prof. Jang G. Lee, Automatic Control Res. Centre Seoul National University San 56-1, Shinrim-Dong, Kwanak-Ku Seoul 151-742 Korea FAX: +82 2 878 8198 e-mail: jgl@asrignc3.snu.ac.kr
ICSC/IFAC Intl. Symposium Neural Computation – NC 98	Sept. 23-25 1998	Vienna Austria	31 Jan. 1998	ICSC Canada, POB 279, Millet Alberta T0C 1Z0, Canada FAX +1/403/387 4329 e-mail: icsc@compusmart.ab.ca

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A Journal of IFAC the International Federation of Automatic Control

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Renewal of Affiliate Membership Reminder

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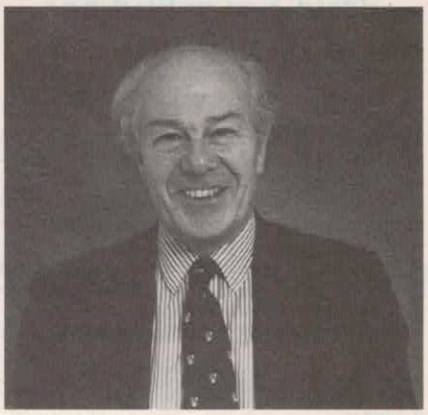
WHO IS WHO IN IFAC



Prof. H. Anthony Barker, Council Member

Tony Barker was born in Nottingham, England, in 1931 and received an Honours Degree in Mathematics from Nottingham University in 1952. After two years in the army, where he worked on control systems for tank gun stabilisation, he joined the Aero-Engine Division of Rolls Royce as a project engineer on engine and aircraft fuel systems. Some of the control systems he designed then are still flying! In 1959 he joined the control group led by Professor John Coales at Cambridge University as a research student. On completion of his PhD, he moved to Glasgow University to set up a new control activity in the Electrical Engineering Department. In 1970 he was appointed Professor of Electrical Engineering at Aston University. Since 1980 he has been the Senior Professor of Electrical Engineering at the University of Wales, Swansea, where he has held the posts of Head of the Electrical Engineering Department, Head of the School and Dean of the Faculty of Engineering and Vice-Principal of the University.

During his career he has published over 100 papers, mostly in the research areas of System Identification and Computer-Aided Control System Design. In addition to Premium awards for several of these papers, he was awarded the Sir Harold Hartley Medal of the Institute of Measurement and Control in 1992 for his contribution to the technology of measurement and control.

Professionally he has been active both nationally and internationally. In the Institution of Electrical Engineers he was Chairman of the Control and Automation Division in 1978/79 and Vice-President from 1986-89. He was the President of the Institute of Measurement and Control in 1995/96. Since 1992, he has been Chairman of the United Kingdom Automatic Control Council, the National Member Organization of IFAC. He was a member of the IFAC Applications Committee from 1984-88 and has chaired the National Organising Committees of three IFAC Symposia, on Microprocessors for Instrumentation and Control in 1980, on Identification and System Parameter Estimation in 1985 and on Computer-Aided Design of Control Systems in 1991. In addition he has served on many International Program Committees. He was elected a member of the IFAC Council in 1996.

Please note the new e-mail address of the IFAC Secretariat:

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This number is immediately valid.

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can still be used in parallel until February 1997.