

Newsletter

Automation: Hope or Menace?

Belgian NMO Celebrates 25th Anniversary

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The Belgian Federation of Automatic Control (IBRA-BIRA) was founded in 1955 under the presidency of Professor R. van Cauwenberghe of the University of Brussels. In accordance with Belgian two-language-regulations, it carries two names and two abbreviations and in fact consists of two institutions. IBRA stands for "Institut Belge de Regulation et d'Automatisme" and caters for the French-speaking part of the country with local sections in Brussels, Charleroi and Liège. BIRA denotes the Flemish equivalent i.e. "Belgisch Instituut voor Regeltechniek en Automatisering" being responsible for the Dutch-speaking part of the country. It has no local sections but has several working groups whose activities center mainly in Antwerp, Ghent and Brussels.

Both institutions have about 400 individual and 40 collective members (industrial firms), both publish their own news bulletins and cooperate with the Netherlands in editing the Benelux Journal of Automatic Control, the "Journal A".

Since the foundation of IFAC in 1956 the Belgian Federation of Automatic Control has been the NMO of IFAC, and since 1979 it is also the NMO of IMEKO. The president at the moment is Prof. A. R. Cauwenberghe (University of Ghent) and the vice-president is Dr. P. Gilard (Institut National du Verre, Charleroi).

In December 1980 the Federation celebrated its 25th anniversary with a day of conferences in Brussels. The theme: "Automation — Hope or Menace, a Challenge for Mankind" was dealt with by several speakers. Control engineers, sociologists, managers and trade unionists discussed the impact of modern control techniques such as robotics, microelectronics, process computers etc. on the future society (employment, energy, environment, education...).

IFAC's second Vice-President, Prof. Manfred Thoma submitted the congratulations of the IFAC family, and IFAC Treasurer, Dr. Michel Cuénot gave an overview of the history of automation. On the whole, he was optimistic about the future effects of automation on mankind: it could enhance man's possibilities to use his judgement and initiative and make his efforts and activities more valuable whilst less tedious and less strenuous.

In a second contribution, the similarities and differences between management and con-

trol systems theory were dealt with. Particularly, the market and the industrial enterprise were discussed as dynamic processes to be optimized. Prof. Van der Grinten from DSM and Eindhoven University warned against a blind application of control systems theory to such economic processes. Some thoughtful and subjective filtering and interpretation is necessary. But all these problems can be tackled easier by the control engineer than by the sociologist or economist.

The next speaker, Dr. Hueber of the Directorate for Research, Science and Education of the Commission of the European Communities in Brussels, in a well documented exposé dealt with the impact of the new technologies (microelectronics, digital techniques) on employment from an European point of view, dealing with the possible loss of employment and the change in the quality of work. The rising concern about these matters should gradually have a positive effect on the creation of new jobs. However, many studies indicate that there will be an intense structural change, i.e. change of the organisation and kind of work and of training requirements. Not only industrial production itself will be affected but also the organisation, the division and the location of labour and the demand for products and services. We should look out for new forms of employment and the social innovations needed to master the social change.

Prof. Heetman from Eindhoven University reported on the influence of microelectronics on industry and life in the Netherlands (based on the Rathenau-report to the Dutch government). He noticed that future unemployment will certainly increase for those with a (non-technical) academic (university) degree and also emphasized that quick action should be taken.

Dr. Denis, head of the strategic planning department of FN Belgium, gave an overview of the possibilities of industrial robots and their impact on the future industrial environment. Over 10% of the labour jobs could technologically be "robotized". Particularly the automotive, mechanical and electromechanical industries are liable to be further automated with industrial robots. Clearly Japan is leading in this area, followed by the USA and the European countries. Many countries are actually setting up robot research and development programs so that an interesting evolution could be expected for the 80s. In some respect it was reassuring

SYMPOSIA REPORTS

Large Scale Systems: Theory and Applications

The 2nd IFAC Symposium on Large Scale Systems: Theory and Applications was held in Toulouse (France), June 24-26, 1980 with 181 attendees coming from 29 countries.

The programme contained:

- 4 plenary lectures
- 3 case studies
- 1 round table discussion
- 56 papers (selected from 175 submitted abstracts from 30 countries).

The presented papers covered the following topics:

LARGE SCALE SYSTEMS MODELLING

This group of papers dealt with the analysis of complex systems using graph theory, the information aspects in large scale systems, the decomposition of such systems for the analysis of stability.

STABILITY OF LARGE SCALE SYSTEMS

On this important topic, most of the papers considered interconnected systems, the stability being analysed using vector Lyapunov method or limiting equations. In some cases the emphasis was put on the structure and the effect of structural perturbations on the performance of the systems was analysed.

HIERARCHICAL AND DECENTRALISED CONTROL

This topic corresponds to the use of several controllers on the same process; in this context the cases of weak coupling, dynamic coupling and of management of the interconnection at a third level were presented. The use of approximate models, the influence of slow external disturbance and the decentralised control of non linear systems were also investigated.

ORDER REDUCTION AND TIME DECOMPOSITION TECHNIQUES

In this group mainly aggregation techniques (choice of the important modes, aggregation retaining the initial structure) and singular perturbations techniques (for three time scale systems and non linear systems) have been studied.

MULTICRITERIA OPTIMISATION AND GAMES THEORY

One important feature nowadays of the analysis of complex systems is the multicriteria analysis. This fact was recognised during this symposium with different papers on multicriteria optimisation (Pareto solution, Stackelberg strategies, different kind of information, distributed parameter games).

DECISION PROCESSES AND PRODUCTION PLANNING

In this topic various types of systems were considered with their associated problems of decision and planning: population process, socio-economical systems, complex production systems.

While the sections described above were oriented towards methodology and theoretical aspects related to large scale systems, the following four sections are devoted to important application areas.

POWER SYSTEMS

This field remains a good example for the application of large scale systems methodology. This fact was illustrated by different papers on decentralised control, decomposition and order reduction, management and planning by decomposition.

TRAFFIC CONTROL PROBLEMS

Two kinds of traffic were considered: urban traffic and air traffic in different papers using decomposition techniques and hierarchical control.

NETWORK AND RELATED SYSTEMS

Service networks (data network or telephone network) are a new class of interest in the field of large scale systems and were represented at this symposium; an emphasis was put on telephone networks.

OTHER APPLICATIONS

In this last group, problems related to real applications (thermic process, chemical process, steel works, ...) were explained. The common feature of all these contributions was the use of hierarchical structures.

Four plenary lectures dealt with:

- A preliminary model for distributed algorithm by P. Varaiya
- Subsystems, time scales, and multimodelling by P. Kokotovic
- A view on control and coordination in hierarchical systems by W. Findeisen
- The role of aggregation and granularity in information and decision analysis by L. Zaden

and gave new insights on important topics of the large scale systems methodology.

One round table discussion dealing with the

- Computer aided design techniques for the control of large scale systems and three case studies

- Control of service networks, particularly telephone networks
- Control of power systems: the French network
- Advanced automation allowed the participants to analyse the main fields of applications and to discuss some difficulties encountered when trying to apply well-known theories or methodologies for large scale and complex systems.

In conclusion: this successful symposium permitted all participants to obtain updated information on theory and applications in large scale systems, complex systems field:

- The singular perturbations techniques are more and more used for order reduction, hierarchical control, multimodelling.
- The multicriteria analysis becomes useful in many areas: planning of socio-economical systems, control of technological processes. This approach induces interesting problems related to the use and the knowledge of utility function.
- Fuzzy concepts have to be introduced more frequently in the modelisation of complex systems and decisional processes.
- Concerning the applications, beside the power systems, service networks and mainly telephone networks become more and more important.

Professor A. TITLI

Distributed Computer Control Systems

Forty-two experts from eight countries attended the Second IFAC Workshop on Distributed Computer Control Systems organized by the Canadian NMO to IFAC and held in Ste. Adele, Quebec, Canada from September 29 to October 1, 1980.

Notable among the attendees were five representatives from the People's Republic of China. China has offered to host the Third Workshop in this series in Beijing from August 15-17, 1981 just prior to the IFAC Congress in Kyoto, Japan.

There were five Workshop sessions in which ten papers were presented as well as a panel discussion and an open forum. This format provided sufficient time to permit fruitful interaction and exchange of ideas between the attendees in the true spirit of a "workshop".

In the opening Session, chaired by Charles Diefenderfer, an analysis of data link control

procedures and a report on the current status of the IEEE local area network standards effort were presented by M. J. Kryskow and J. Clancy. These presentations were followed by a panel discussion on "The Practicality of Data Highway Standards" led by Mr. Diefenderfer who was joined by Kryskow, Clancy and Dr. Lalive d'Epinay.

Dr. Hermann Kopetz chaired the second Session in which D. McClure and T. McNeil, W. Fieguth and G. A. Hepburn described the application of distributed computer control in a gas plant and in nuclear generating stations.

Dr. Thomas Harrison, who organized the First IFAC DCCS Workshop in 1979 and was Chairman of the IPC for this Second Workshop, led Session III. Following presentations by H. Kopetz on "DCCS for Integrated System Control" and C. M. Woodside "Load Balancing and Configuration Analysis for Distributed Computer Control Systems", Dr.

Harrison opened the meeting for a discussion on "The Future of DCCS".

D. Wayne and D.J. Fraade presented case histories of distributed computer control in an integrated pulp mill complex and in the pharmaceutical industry in Session IV chaired by Prof. Mike Rodd.

In the closing Session, chaired by Dr. Lalive, H. Takatsu described the system architecture of the Hokushin HOMAC system and Dr. E. Anzaldi described an application of distributed computer control in the food industry.

All who attended agreed that the Workshop was a great success. This was due not only to the content and quality of the papers and the discussions which they encouraged but also to the very pleasant location of the Workshop in the Canadian Laurentians.

R. W. Gellie

Control Applications of Nonlinear Programming and Optimization

The 2nd workshop on this topic was organized by VDI/VDE Gesellschaft für Meß- und Regeltechnik and the Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt (DFVLR) and was held at DFVLR's research center in Oberpfaffenhofen, near Munich, September 15-17, 1980.

The workshop was attended by about 70 people, 30 from W-Germany, the rest from many countries in Europe, from USA, Canada, Mexico, Argentina, South Africa. It provided a forum for discussion of recent advances in nonlinear programming and optimization techniques and their application to: Control System Design, Flight Mechanics, Chemical Engineering, Nuclear Engineering, Structural Engineering, and Solar Heating and Cooling. Under the Scientific Chairmanship of Prof. A.E. Bryson, USA, 35 contributed papers and 2 invited papers (Prof. A. Miele, USA, Prof. P. Deuffhard, W-Germany) were presented.

A collection of Technical Papers is available and copies can be obtained from Dr. K. Well, DFVLR, 8031 Wessling, FRG.



Programming and Optimization seem to have had satisfying results - certainly as far as the weather and the environment were concerned.

IFAC Congress 1981 Advance Program Available

The Third Announcement for the IFAC World Congress in Kyoto will come off press shortly. It contains all information relevant to registrants (e.g. organisation, transportation and travel arrangements, hotel accommodation, registration forms, etc.), details on the Technical Programs (topics and speakers of Plenary Sessions and Technical Sessions, Case Studies, Round Table Discussions), information on the technical exhibition and on technical visits organised along with the Congress and — not less important — social events and Post Congress Tours, offered to complement the program.

Order your copy from
IFAC/81 Secretariat
Kinki Hatsumei Center
14 Kawahara-cho, Yoshida Sakyo-ku
Kyoto 606, Japan.



1981
AUGUST 24-28
KYOTO, JAPAN

Group Flight

The Japan Travel Bureau (JTB) and Japan Air Lines (JAL) have been appointed official travel agency and official carrier for the Congress.

For information regarding group tours contact your nearest JAL office or any other travel office of your choice.

The Congress Secretariat in Kyoto and the IFAC Secretariat in Laxenburg will also be pleased to provide advice and assistance.

NEXT EVENT

IEEE International Conference: CONTROL AND ITS APPLICATIONS

University of Warwick 23-25 March 1981

The control field has matured considerably over the past decade and research and development efforts are shifting to meet new demands. The conference 'Control and Its Applications' has been organized to reflect this fact by acting as a general forum and bring together teachers, researchers and

industrial and other users of control concepts to meet, present their work, exchange ideas and discuss the success of past research efforts and possible future trends. The final programme consists of approximately eighty papers in many of the established and rising control fields. The programme is divided into eighteen sessions devoted to specific areas such as multivariable systems control, computer-aided design, self-tuning and adaptive control, systems modelling and identification, optimization, stability and nonlinear and large-scale systems together with sessions devoted to applications in the biomedical, mechanical

and automotive, power and environmental fields and computer control. A number of review lectures have been arranged.

The conference is supported by a number of social events and there will be an opportunity to look round the computing and laboratory facilities on site.

Further details available from
Conference Department, The Institution
of Electrical Engineers
Savoy Place, London WC2R 0BL
Tel.: 01-240 1871 Ext: 261, Telex: 261176

Preview for the Next Issue May 1981

PAPERS

Recent Trends of Manufacturing Technology in Japan (Y. Oshima)

Optimal Control Solution of the Automotive Emission - Constrained Minimum Fuel Problem (A.R. Dohner)

A Second Generation Adaptive Autostabilization System for Airborne Vehicles (P. Young)

An Algorithm for Non-Linear Space-Time Nuclear Reactor Control (G.L. Yorke, D.B. Cherkas)

Self-Tuning Optimum Start Control of Heating Plant (A.L. Dexter)

Prediction of Air Pollutant Concentrations in Tokushima Prefecture, Japan (T. Yoshimura, Y. Okamoto, T. Soeda)

Time-Domain Input-Output Representations of Linear Systems (J.D. Aplevich)

A Study of MBH-Type Realization Algorithms (J. Staar)

Convergence in the Boundary Layer for Singularly Perturbed Equations (B. A. Francis)

BRIEF PAPERS

Optimal Control of a Solar Collector Loop Using a Distributed-Lumped Model (A. Orbach, C. Rorres, R. Fischl)

Multivariable System Structure and Parameter Identification Using the Correlation Method (H. El-Sherief)

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to hear that it will always be far easier to make a robot of a man, rather than to make a robot like a man (Engelberger).

The last speaker was Prof. Sauvy, from the Collège de France in Paris. He indicated that unemployment can only be reduced by taking more advantage of the services offered by the tertiary sector of the economy. However, this requires that these services (administration, banking, insurances, education, health care...) should become cheaper, which can only be obtained by increasing their productivity by further automation. Once their productivity would be comparable to the productivity of industrial production, more favourable jobs would become available. He did not hide though that economists do not have clearcut solutions to propose, partly due to lack of sufficient data such as the labour matrices for different products.

Every day it becomes more apparent that the near future will bring us many new products, many new ways of automating and organizing our activities. Our way of life could be influenced profoundly due to the fast technological developments. We will all be facing this new challenge to human inventivity and creativity. Let us hope that this will lead to a more interesting and more valuable world, to a more human way of life. May the control and systems engineering community take its active part in ensuring this.

Prof. A. van CAUWENBERGHE.



NEW

PUBLICATIONS

Topics in Identification and Distributed Systems

by Erhard Bühler and Dieter Franke, edited by Irmfried Hartmann.

This volume consists of two contributions, the control of bilinear distributed parameter systems and the on-line estimation with a new nonlinear Kalman-Bucy algorithm. 42 figs. — Braunschweig: Vieweg 1980. X, 170 pages, price: DM 48.—

IIASA Reports

A new international journal.

For those who are already familiar with the International Institute for Applied Systems Analysis this journal will provide information at regular intervals about the scientific progress of the Institute. For others, the journal will offer the first opportunity to become acquainted with the research activities of a unique international scientific institution.

The title IIASA Reports was chosen with two meanings in mind. First, the journal is a compilation of selected IIASA Reports, which are also published by the Institute in separately bound form. Second, it is a medium by which the Institute reports on its work to the worldwide scientific community.

The journal reflects the wide interests of the Institute and its collaborating institutions. Its fundamental concern is to bring the knowledge and methods of science and technology to bear on important national and international problems. And its commitment is to the development and dissemination of the craft of systems analysis to fulfill this goal.

Annual subscriptions to the quarterly journal IIASA Reports are available at the following rates:

Subscribers from IIASA National Member Organization countries:

Institutions:	US \$ 50.—
Individuals:	US \$ 25.—

Subscribers from other countries:

Institutions:	US \$ 75.—
Individuals:	US \$ 37.50

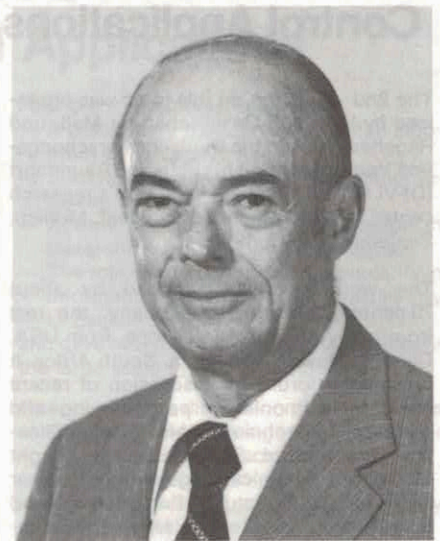
A sample copy can be obtained from the Publications Department, IIASA, A-2361 Laxenburg, Austria.

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WHO IS WHO IN IFAC



William E. Miller
Member IFAC Executive Council

Born December 18, 1917, in Los Angeles, California, he received a BS degree with honors in Electrical Engineering from the University of California in 1939. Following graduation, he joined the General Electric Company. While a design engineer in the Large Generator and Motor Department, he graduated from the Company's three-year Advance Engineering Program. In 1946, he joined the Industrial Engineering Department as systems applications engineer.

In 1951, he was presented a George A. Coffin Award, General Electric's highest Corporate honor, for engineering contributions to the development and design of a new system for the automatic control of steel tandem cold reduction mills. This engineering work done in the mid-40s brought the first high-accuracy, fast-response feedback control systems to the steel industry. All rolling mills since have used comparable drive system and control concepts.

Mr. Miller has been active in IFAC since the first Congress in Moscow in 1960, serving as Chairman of IFAC's Technical Committee on Applications, Chairman of the Advisory Committee responsible for technical affairs of IFAC, and as Chairman of the Policy Committee responsible to the Executive Council for suggestions on operating policy. In 1978 he was elected member of the Executive Council.

His more than 50 technical papers and articles on drive and automation systems have been published in several languages in widely separated parts of the world.

Mr. Miller is a Fellow-IEEE, a licensed Professional Engineer in the State of New York, a member of the National Society of Professional Engineers, the Instrument Society of America, the IEEE's Control Systems Society, Computer Society and Industry Applications Society and is a Life Member of the Association of Iron and Steel Engineers.

In his present assignment with General Electric Company's Drive Systems Department he works on special problems in business planning, engineering and manufacturing relating to his Department's international business activities.