



UNIVERSITY OF NIŠ

The scientific journal **FACTA UNIVERSITATIS**

Series: **Mechanics, Automatic Control and Robotics** Vol.2, No 8, 1998 pp. 825 - 828

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## A REPORT ON THE VI INTERNATIONAL CONFERENCE ON SYSTEMS, AUTOMATIC CONTROL AND MEASUREMENTS SAUM' 98

VI International Conference on Systems, Automatic Control and Measurements SAUM '98, organized by SAUM (Association of Serbia for Systems, Automatic Control and Measurements), was held in Niš, Serbia, Yugoslavia. The conference was opened on September the 28<sup>th</sup> and lasted for three days, until September the 30<sup>th</sup> 1998. Co-organizers of the conference were Faculty of Mechanical Engineering and Faculty of Electronic Engineering, University of Niš and Faculty of Mechanical Engineering, University of Belgrade and the whole project was supported by Ministry of Science and Technology of Serbia and Federal Ministry for Development, Science and Environment of Yugoslavia.

The conference was carefully planned and prepared well in advance so the first announcement and call for papers was issued in January 1998. and was available at the Conference Internet Site as well. Good organization of the conference was accomplished owing to successful coordination of the conference chairman, Assoc. Prof. Dr **Zoran Bučevac**, meritorious SAUM member, and his cooperation with Organizing Committee. Honorary Committee and International Program Committee, consisting of distinctive professors in their fields, gave the special significance to the conference.

This year, for the first time since SAUM was founded, one SAUM conference was organized at the international level. The idea about the international character of SAUM meetings originated from the very beginning of SAUM activities and was finally realized with the VI International SAUM Conference in Niš. The previous five SAUM conferences were organized every third year since 1983. and the participants were mostly from Yugoslavia. SAUM attempts to maintain the dynamics of its conferences and the plan is to continue organizing meetings in the future with the wish to bring them to a higher level each time.

The significant step forward in SAUM activities development was accomplished by organizing the VI International SAUM Conference. Submitted papers were internationally reviewed and approximately 100 papers were accepted by the Program Committee to be included in the conference program. About 70% of all papers were written by Yugoslav authors (which is approximately 120 authors) and the rest were written by approximately 50 foreign authors from Australia, France, Germany, Japan,

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Received November 5, 1998

\* The report was prepared by *Tamara Nestorović*, postgraduate student at the Faculty of Mechanical Engineering, University of Niš. For more detailed information about the Conference and the papers, readers should refer to the SAUM '98 Conference Proceedings, or contact the conference chairman Assoc. Prof. Dr Zoran Bučevac, e-mail: [zbucevac@EUnet.yu](mailto:zbucevac@EUnet.yu).

Moldavia, Romania, Russia, South Africa, Ukraine, and USA. All the papers accepted for the conference program were printed in English in the Conference Proceedings.

Besides regular papers, which were divided into seventeen sessions, the Proceedings includes six plenary session papers, written by eminent invited authors from abroad. These papers covered a wide range of fields in automatic control such as: conventional control methods using PI and PID controllers tuned by a generalized form of the symmetrical optimum method, Lyapunov functions and their applications, the Hamiltonian approach to optimal control and filtering problems, variable structure systems and intelligent autonomous systems as a challenge to control engineers. The last mentioned field is the one of special interest of the professors **Ljubiša Vlačić** from Australia and **Makoto Kajitani** from Japan who presented a lecture on intelligent autonomous systems at the plenary session *Intelligent Autonomous Systems - A Challenge to Control Engineers*. The invited paper *Methodology for Direct Construction of Lyapunov Functions and Applications*, written by **Vladimir Bajić** from the Republic of South Africa, was another contribution to the conference. **Zoran Gajić** (USA) and **Myo-Taeg Lim** (Korea) proposed a unified approach for optimal control and filtering of linear continuous-time singularly perturbed systems, in the invited paper *Hamiltonian Approach to Linear Continuous-Time Singularly Perturbed Optimal Control and Filtering Problems*. A survey on variable structure systems was given by **Branislava Peruničić**, **Čedomir Milosavljević**, **Goran Golo** and **Darko Mitić** at the plenary session. Another invited paper was written by **Stefan Preitl** and **Radu-Emil Precup** from Romania. Their contribution is *Tuning of PI and PID Controllers by a Generalized Form of the Symmetrical Optimum Method*. **Vinogradov**, **Budkin** and **Temliakov** from Russia gave a survey on *Modern Status of Dynamically Tuned Gyros and Perspectives of their Use*.

Regular papers were divided into sessions which covered following topics on theory, engineering, production, application, usage and selling of hydraulic, pneumatic, electronic, computer technology based on combined control components, semi-automatic or automatic control systems:

- A/D conversion and data acquisition
- sensors and measurements
- analysis and design of electrical machines' control systems
- controller and control system design
- modeling of components and systems
- system analysis
- automation and logic control
- machinery, industrial processes and missile control
- fuzzy logic and control
- invention protection, education, safety and some realizations
- in the area of automatic control
- modeling and system parameters identification
- variable structure control systems and neural networks
- vehicle dynamics and control.

The papers from the session *A/D conversion and data acquisition* proposed some new solutions concerning analogue to digital conversion in industrial environment, universal A/D conversion of non-electrical quantities, well logging acquisition systems, using program package for data acquisition and using a PC parallel port for control and

data acquisition.

**Sensors and measurements** were discussed in two sessions. Those discussions included:

- semi-conductor gas sensors,
- sensor matrix for tactile sensing,
- instrument transformers in contemporary electronic instruments,
- mechanical-to-electric transducers,
- flow measurements in partially filled pipes,
- wide rang high accuracy measurement of the motor rotational speed,
- choice of digital sensors for auxiliary motion at numerical drilling-grinding machines,
- system for measurement,
- control and safety realization of rocket motor testing and
- measuring erosive burning rate of solid rocket propellants.

Analysis and design of electrical machines' control systems were considered in papers on:

- compensation strategy for suppressing speed oscillations of induction motor,
- current regulation method in vector controlled permanent magnet synchronous machine,
- high performance control of a permanent magnet stepping motor,
- velocity estimation in digital controlled DC servo drives,
- positionally digitally controlled DC motor in mechanical ratcheting and
- design of digitally-speed-controlled servo drive with extended observer.

**Design of controllers and control systems** was surveyed over two sessions. They included different approaches to control design like: design of  $H_{\infty}$  controllers, control system design using orthogonal polynomials, optimal control design and LQG optimal control, sequential design of decentralized controllers, digital control design using observers, feed-forward compensators and others.

**Modeling of components and systems** was discussed in papers considering hydraulic and electro-hydraulic control systems, as well as modeling, simulation, identification and control for different systems from implementation point of view.

Papers on **system analysis** considered: three phase system quality estimation under non-sinusoidal conditions, symbolic computation of impulse, step and sine responses of linear time-invariant systems, sensitivity of the process control system, fault detection in non-linear chemical process.

Contributions in the fields of **automation and logic control** and **manipulator and robot control** proposed: improvements on the control logic and protection for thermal power plant installations, automation of analyzing capacity and profitability of cable making plants, and other new approaches to logic control through case studies, as well as different results in manipulator and robot control.

Electro-hydraulic and electro-pneumatic servo systems as well as hydraulic velocity servo system were main subjects of discussions concerning implementation of **automatic tracking control**.

**Machinery, industrial processes and missile control** were studied in papers referred to airplane part production, control systems in virtual manufacturing, development of software system for control of fuel economy and diagnosis of operating conditions of one steam turbine unit, target tracking and giro power drive.

**Fuzzy logic and control** was covered in papers based on theoretic work and applications on fuzzy systems in general, and some special fields of fuzzy logic implementation were discussed, too.

One of the contributions in the fields of *invention protection, education, safety and some realizations in the area of automatic control*, was the proposal of a concept of Faculty of control engineering, given by professor **Lyubomir Gruyitch** from France. In his contribution *Faculty of Control Engineering* he pointed that: "Automatic control science and engineering has become both a self-contained scientific and engineering domain. It is characterized by its own, original and important tasks, problems, methods, methodologies, techniques and technologies. It is among the engineering areas with the greatest combinatorics of possible design solutions and implementations. Its applications have become among the widest applications. Automatic control has been dominating for its superiority over manual or semi-automatic control for large classes of. Control engineer duties demand highly responsible and fully competent professionals. They are to be educated as complete automatic control engineers at the undergraduate level. Such an adequate education should be provided by Faculty of control engineering, a concept of which is proposed."

*Modeling and system parameters identification* were covered in papers on:

- obtaining state space model from bond graph model with derivative causality using Laplace transform,
- identification of steam super-heater parameters using on-line measurements in thermal power plant "Kostolac B",
- determination of non-measurable servo system parameters using maximum likelihood method,
- overtraining in multilayer neural networks,
- postprocessing of the system states with self organized neural networks and
- identification of the elastic-mass characteristics of the aircraft using the vibration testing data.

*Variable structure control systems and neural networks* were discussed as parts of one session, which included papers on variable structure systems and their static accuracy, adaptive variable structure systems, digital variable structure controllers as well as papers on application of neural networks.

The papers considering *vehicle dynamics and control* proposed some solutions concerning oscillations, vehicle design, vehicle suspension system and automatic regulation of a driving bulldozer motor and its working equipment control. Most of the papers were based on the researches of Zastava-Institute for Automobiles employees.

The authors of the papers in mentioned sessions are from wide range of professional areas. Most of them are from university centers, but also from scientific research institutes and industry. Presenting their papers they attempted to show fragments of their researches, results and discoveries and to share their experiences and knowledge in the fields of interest. Gathering of professionals, experts, engineers, researchers and scientists from all areas of automatic control, system theory and engineering, measurements and informatics dealing with automatic control and from other related fields, at SAUM Conference, enabled exchange of experiences, views and results of research in these areas. It also opened entrance to development of new ideas based on surveying present state of automatic control implementation in industry, education, systems and control science and engineering. From that point of view VI International SAUM Conference confirmed itself as an outstanding conference with perspective to gather even more researchers and present their results in the future.