

# DEPARTMENT OF SYSTEMS AND CONTROL

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*The Department of Systems and Control is engaged in research, development, applications and education across a variety of areas of control technology. Its mission is “to bridge the gap between theory and practice”. Hence, the research activities are relatively application oriented, and the content of the work is closely related to the needs of production companies. The activities of the department are focused on the research of new methods and algorithms for automatic control, the development of procedures and tools to support the design and construction of control systems, the development of specific measurement and control modules, and the development and construction of complete systems for the control and supervision of machines, devices and industrial processes.*

## Basic and applied research

The basic and applied research during 2008 was devoted to four sub-areas: the analysis and control of complex systems and processes, fault detection and isolation, computer-integrated production control, and advanced implementation technology.

In the sub-area **analysis and control of complex systems and processes** our work was devoted to the development of some general purpose methods. The research in dynamic systems modelling of Gaussian process models was directed towards various computer-simulation methods and the propagation of prediction uncertainties. Application case studies of conventional and explicit predictive control based on Gaussian process models were also pursued. In the field of advanced control algorithms we continued R&D on parametric predictive controllers based on linear and hybrid models. In the final phase of the EU 6FP project CONNECT we have successfully completed two pilot case studies using such controllers in industrial environments: pressure control in a vacuum chamber and cooling-water temperature control in a CHP unit. The tuning of PID controllers is a traditional research area at our department. In 2008 a new, efficient tuning algorithm was developed, which does not require any additional input from the operator, except an open-loop or a closed-loop experiment.

New control methods and algorithms were developed in various specific problem domains. Within the EU 6FP project PEGASE a system for landing aircraft and helicopters automatically is being developed, which is completely autonomous and does not depend on any kind of infrastructure or equipment, located outside the aircraft. The idea is to guide the aircraft using images, acquired by a camera installed on the aircraft. In 2008 a position-based predictive control scheme that uses a set of local linear models was developed (Fig 1). Within the EU 6FP project PRISM the control algorithms for the online dosing of process ingredients was proposed and tested on the developed mathematical model of the polymerization process. The control algorithms keep the reactor temperature in a narrower region and shorten the batch cycle by around 10%. For wastewater-treatment processes, research on the automatic generation of conceptual descriptions of classifications was performed in cooperation with foreign partners.

In the sub-area of **fault detection and isolation** work has been conducted along two main lines. In the area of rotational machinery the focus was on gearbox drives. In cooperation with the Faculty of Mechanical Engineering, University of Ljubljana, a laboratory test-bed has been functionally completed along with a new prototype for online oil analysis (Fig. 2). The software for the administration of the experimental runs is realized in the Labview environment. It takes care of the acquisition and archiving of 21 measurement channels, so that the content is accessible over the web. Thus, a valuable benchmark is believed to become available to the researchers and potential users. Research has been concentrated on feature extraction for several of the most common faults in mechanical drives, such as pitting, scarfing, unbalance and various misalignment faults. New algorithms have been designed by employing the vibration measurements, the noise and the current of an electrical motor. An extensive laboratory study has been performed, showing that features based on electrical current reflect the nature of mechanical faults in mechanical drives reliably enough. This result paves the way for the development of an efficient, low-cost monitoring and fault-diagnosis device, which would be widely applicable in industry.



Head:  
**Prof. Stanislav Strmčnik**

**Within the highest state awards for scientific and research achievements, issued by the Slovenian Ministry of Higher Education, Science and Technology, the “Puh” award for development achievements was this year bestowed on our colleague Dr Gregor Dolanc, for a system for the automatic control of a steel-strip slitting line.**

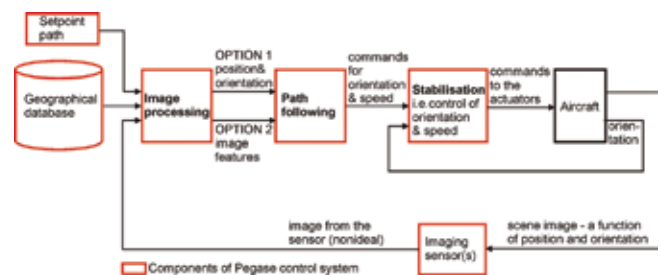


Figure 1: A simplified scheme of the image-based aircraft-landing control system

**An international workshop called “PhD Workshop on Systems and Control - a young generation viewpoint” was this year organised by PhD students from our department and sponsored by the IEEE Slovenian section.**

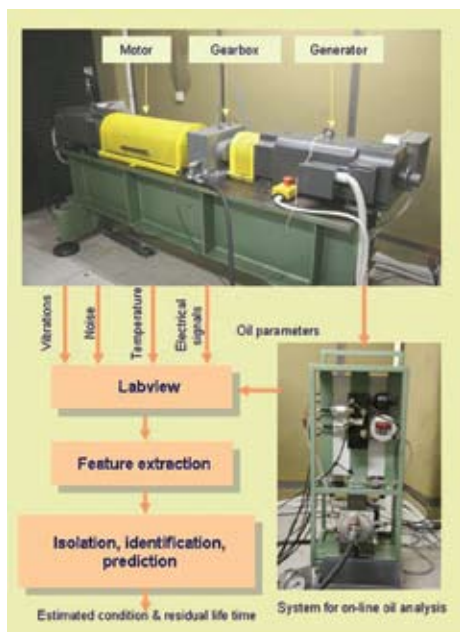


Figure 2: A monitoring system for rotational machinery and drives



Figure 3: A 7-kilowatt fuel-cell-based auxiliary electrical power unit installed in a special purpose military vehicle

**Among their new products, Mitsubishi Electric announces PLC Batch – a tool designed at our department and implemented in cooperation with the company INEA**

Another area refers to the robust model-based fault diagnosis of non-linear dynamic systems. Almost all of the available techniques assume prior knowledge of the system model, which is not easy to obtain. Therefore, the emphasis in the initial phase of the research was on the identification of continuous nonlinear models from discrete process data. This includes parameter estimation, the estimation of noise statistics and, potential miss-modelling effects.

A part of the work related to this sub-area was devoted to the EU 6FP project BRACCIA, which deals with the problem of monitoring the depth of anaesthesia. A special device, Cardio&BrainSignals, which was developed at our department, was used to perform experiments on laboratory animals during anaesthesia. The gathered data was then analysed using state-of-the-art methods for causality inference. The preliminary results of the study indicate that interactions between several biological oscillations could be used to monitor the depth of anaesthesia.

Our research in the sub-area of **computer-integrated production control** was concentrated on the design and verification of a hierarchical production control system. In 2008 a concept for production control, based on an expert system for a case-study chemical batch production, was developed. The activities towards the development of a suitable methodology for the identification of key production indicators have also been performed using the well-known Tennessee-Eastman benchmark process.

In the area of **advanced implementation technologies** a part of the activities was devoted to the development of a rapid-prototyping tool for the design and implementation of control algorithms. A feed-forward compensator, multivariable controller and PFC (Predictive Functional Controller), with appropriate tuners, have been implemented in 2008. The second part was related to methods and tools for the development of control SW. Guidelines for the systematic procurement of software tools, used for the realization of the model-driven engineering paradigm in software development, have been developed. These guidelines minimize the cost and risk during the adoption of model-driven engineering. Based on the guidelines a suitable tool was selected. To fulfil the needs for the development of new electronic devices further work on the environment, which will enable the design of embedded control and digital signal processing systems, was carried out. The ARM-microcontroller-based evaluation boards were successfully connected into the Ethernet communication network and the distant code downloading and execution supervision were prepared. With the connection to the LabView software tools a very convenient design environment was established and successfully used during the design of the ARM-based embedded control devices for various industrial customers. Also, the Cortex-M3-based ARM microprocessor was evaluated for diverse applications.

#### R&D projects for industry and other users

In cooperation with the **Slovenian Ministry of Defence** four projects in the area of fuel-cell-based system applications and the development of subsystems for fuel-cell power units are being performed. In November 2008 the project to install a 7-kilowatt fuel-cell-based auxiliary electrical power unit into a special purpose military vehicle was completed. A still ongoing project is the design of a mobile cogeneration fuel-cell-based system for military use, where during this year the complete project documentation has been elaborated. In the frame of the project with the goal to develop a reliable ceramic fuel reformer for small-power fuel cells we have developed a miniature reactor for steam reforming. The last ongoing project is the development of the experimental laboratory set-up for the testing and validation of various subsystems for PEM fuel cells, where in 2008 all the necessary subsystems were defined and the majority of the installation equipment was purchased.

We were also very active in R&D projects for industry. Based on a contract with the company **DOMEL** an Air Delivery Control System was developed. It is intended for the control of air flow in the fuel-cell and natural-gas reformer based a co-generation heating/power supply system. The control system consists of the SmartModule control board

and the control algorithm. The SmartModule is an ARM-based embedded control board, while the algorithm is based on the cross-coupled control automaton and PID control loops. Besides the functional requirements a low cost was also taken into consideration during the design as the final product is also intended for domestic applications. A small series of 25 SmartModules was produced and sold to the PlugPower company (Fig. 4). For the company **GOAP** a new version of an algorithm for calculating the optimal room-temperature set-points in buildings was developed and tested on a simulation model of a hotel building.

In cooperation with the company **INEA** a control system for the resin-synthesis process at the **COLOR** chemical works was developed. In the frame of the project the batch control tool PLCbatch was used. Based on the feedback information from the project, the tool was further improved in terms of the phase behaviour and synchronization model and the recipe system efficiency in terms of reducing the repetition of information and increasing the degree of reuse. For the company **Danfoss-Trata** a new, patented, innovative system for reducing the oscillations in the control loop has been developed and tested within the project "Intelligent Actuators". For the same company a new series of electronic drives for valves, based on BLDC motors, has also been developed.

### Education and training activities

Some members of the department are giving lectures and practical courses at the Faculty of Electrical Engineering, University of Ljubljana, the Faculty of Logistics, University of Maribor, the University of Nova Gorica and the Jožef Stefan International Postgraduate School. They also act as supervisors of M.Sc. and Ph.D. students. Special care was given to post-qualification training for engineers from industry. In 2007, four one-week courses were organized. These courses were organized in close cooperation with the Information Technologies Knowledge Transfer Centre at the Jozef Stefan Institute.

### Some outstanding publications in the past three years

1. Aljaž Stare, Darko Vrečko, Nadja Hvala, Stanko Strmčnik. Comparison of control strategies for nitrogen removal in an activated sludge process in terms of operating costs : a simulation study. *Water res.* (Oxford). [Print ed.], 2007, vol. 41, no. 9, 2004-2014.
2. Alexandra Grancharova, Juš Kocijan, Tor Arne Johansen. Explicit stochastic predictive control of combustion plants based on Gaussian process models. *Automatica* (Oxf.). [Print ed.], 2008, vol. 44, no. 6, 1621-1631.
3. Gregor Dolanc, Stanko Strmčnik. Design of a nonlinear controller based on a piecewise-linear Hammerstein model. *Syst. control. lett.*. [Print ed.], 2008, vol. 57, no. 4, 332-339.

### The most important technological achievements in the past three years

1. A series of electronic drives for valves, based on BLDC motors, 2008, (Janko Petrovčič, Damir Vrančič, Aleš Svetek, Stane Černe, Miroslav Štrubelj)
2. PLCbatch - a tool for the control of batch processes with PLC's, based on the S88.01 standard, 2007, (Giovanni Godena)

### Awards and appointments

1. Dr Gregor Dolanc: within the "Zois" awards, the highest state awards for scientific and research achievements, issued by the Slovenian Ministry of Higher Education, Science and Technology, the "Puh" award for development achievements was this year bestowed for a system for the automatic control of a steel-strip slitting line

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**Members of our department played an important role in the establishment of the Hydrogen Technology Development Centre, of which Jozef Stefan Institute is a founding member.**

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Figure 4: SmartModule - an Air Delivery Control System intended for the control of air flow in the fuel-cell and natural-gas reformer based on a co-generation heating/power supply system



Figure 5: Resin-synthesis batch-process control system based on the PLCbatch tool

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**A substantial part of our work was devoted to final activities within projects of the Centre of Excellence for Advanced Control Technologies (it includes 15 industrial and four academic partners), which is coordinated by our department.**

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## INTERNATIONAL PROJECTS

- Design of Advanced Controllers for Economic, Robust and Safe Manufacturing Performance  
CONNECT  
6. FP, COOP-CT-2006, 031638  
EC; Dr. Constantinos Pantelides, Process Systems Enterprise Limited, London, Great Britain  
Dr. Samo Gerkšič, Dr. Vladimir Jovan
- Helicopter and aEronef naviGation Airborne System Experimentations  
PEGASE  
6. FP, AST5-CT-2006-030839  
EC; Bruno Pattin, Claire Lallemand, Dassault Aviation, Paris, France  
Prof. Stanko Strmčnik, Dr. Gregor Dolanc
- Towards Knowledge - Based Processing Systems  
PRISM  
6. FP, MRTN-CT-2004-512233  
EC; Imperial College of Science Technology and Medicine, London, Great Britain  
Dr. Gregor Kandare
- Explicit Nonlinear Model Predictive Control based on Gaussian Process Models  
Prof. Alexandra Grancharova, Institute of Control and System Research, Bulgarian Academy of Sciences, Sofia, Bulgaria  
Prof. Juš Kocijan
- Bayesian Decision Making to support Change Detection in Complex Manufacturing Systems  
BI-CZ/07-08-011  
Dr. Tatiana Valentine, Department of Adaptive Control, Institute of Information Theory and Automation, Prague, Czech Republic  
Prof. Đani Juričić
- On-line Monitoring and Fault Diagnosis of Industrial Systems  
BI-MK/07-08-018  
Prof. Mile Stankovski, Faculty of Electrical Engineering, Skopje, The Republic of Macedonia  
Prof. Đani Juričić

- Design of PID Controllers: Interchange of Technology and Experience - Second Part  
BI-PT/06-07-005  
Prof. José Paulo de Maura Oliveira, Engineering Department, University of Trás-os-Montes e Alto Douro, Vila Real, Portugal  
Asst. Prof. Damir Vrančić
- Building Virtual Communities for Research and Education in Automation and Control  
BI-SK/05-07-009  
Prof. Mikuláš Huba, Slovak University of Technology in Bratislava, Bratislava, Slovakia  
Asst. Prof. Damir Vrančić

## R & D GRANTS AND CONTRACTS

- An intelligent system for condition monitoring of rotating machinery  
Prof. Đani Juričić
- Optimization of HVAC systems using dynamic models  
Prof. Đani Juričić
- Rapid prototyping of advanced control algorithms in industrial environment  
Asst. Prof. Damir Vrančić
- Early detection of lung cancer in workers with asbestos disease  
Prof. Đani Juričić
- Fuel cell based auxiliary power system for autonomous operation of military vehicles  
Dr. Janko Petrovčič

## RESEARCH PROGRAM

- Systems and control  
Prof. Stanislav Strmčnik

## VISITORS FROM ABROAD

- Pavle Boškosi, Faculty of Electrical Engineering, Ss. Cyril and Methodius University, Skopje, R. Macedonia, 1 Jan. to 31 Dec. 2008
- Dr Kosta Boshnakov, University of Chemical Technology and Metallurgy, Sofia, Bulgaria, 16-17 Apr. 2008

- Dr Jan Prikryl, Institute of Information theory and automation, Academy of sciences in the Czech republic, Prague, Czech Republic, 2-15 Jun. 2008
- Dr Pavel Ettler, Compureg Plzen, Plzen, Czech Republic, 11-14 Nov. 2008
- Teodora Miteva, work in the frame of the project PRISM, Sofia, Bulgaria, 1 Jan. to 23 Dec. 2008

## STAFF

### Researchers

- Dr. Gregor Dolanc
- Dr. Samo Gerkšič
- Dr. Nadja Hvala
- Dr. Vladimir Jovan
- Asst. Prof. Đani Juričić
- Prof. Juš Kocijan
- Dr. Janko Petrovčič
- 8. Prof. Stanislav Strmčnik, Head**
- Asst. Prof. Damir Vrančić
- Dr. Darko Vrečko

### Postdoctoral associates

- Dr. Dejan Gradišar
- Dr. Gregor Kandare
- Dr. Alenka Žnidaršič\*

### Postgraduates

- Matej Gašperin, B. Sc.

- Giovanni Godena, B. Sc.
- Tomaž Lukman, B. Sc.
- Satja Lumar, B. Sc.
- Jernej Mrovlje, B. Sc.
- Dr. Bojan Musizza
- Boštjan Pregelj, B. Sc.
- Aleš Svetek, B. Sc.
- Technical officers**
- Stanislav Černe, B. Sc.
- Primož Fajdiga, B. Sc.
- Maja Janežič, B. Sc.
- Dr. Zoran Marinšek\*

### Technical and administrative staff

- Miroslav Štrubelj

Note:

\* part-time JSI member

## BIBLIOGRAPHY

### ORIGINAL ARTICLES

- Kristijan Ažman, Juš Kocijan, "Non-linear model predictive control for models with local information and uncertainties", *Trans. Inst. Meas. Control*, vol. 30, no. 5, pp. 371-396, 2008.
- Uroš Benko, Đani Juričić, "Frequency analysis of noisy short-time stationary signals using filter-diagonalization", *Signal process.*, vol. 88, no. 7, pp. 1733-1746, 2008.

- Gregor Dolanc, Stanko Strmčnik, "Design of a nonlinear controller based on a piecewise-linear Hammerstein model", *Syst. control. lett.*, vol. 57, no. 4, pp. 332-339, 2008.
- Matej Gašperin, Đani Juričić, Bojan Musizza, Igor B. Mekjavić, "A model-based approach to the evaluation of flame-protective garments", *ISA trans.*, vol. 47, no. 2, pp. 198-210, 2008.
- Marko Gerbec, Vladimir Jovan, Janko Petrovčič, "Operational and safety analyses of a commercial PEMFC system", *Int. j. hydrogen energy*, vol. 33, no. 15, pp. 4147-4160, 2008.

6. Samo Gerškšič, Stanko Strmčnik, Ton van den Boom, "Feedback action in predictive control: an experimental case study", *Control eng. pract.*, vol. 16, no. 3, pp. 321-332, 2008.
7. Dejan Gradišar, Sebastjan Zorzut, Vladimir Jovan, "Model-based production control", *Automatika (Zagreb)*, vol. 49, no. 3/4, pp. 151-158, 2008.
8. Dejan Gradišar, Sebastjan Zorzut, Vladimir Jovan, "Production control of a polymerization plant based on production performance indicators", *Organizacija (Kranj)*, vOL. 41, nO. 6, sTR. 207-217, 2008.
9. Alexandra Grancharova, Juš Kocijan, Tor Arne Johansen, "Explicit stochastic predictive control of combustion plants based on Gaussian process models", *Automatica (Oxf.)*, vol. 44, no. 6, pp. 1621-1631, 2008.
10. Nadja Hvala, Mario Zec, Stanko Strmčnik, "Non-linear model parameter estimation-estimating a feasible parameter set with respect to model use", *Math. comput. model. dyn. syst.*, vol. 14, no. 6, pp. 587-605, 2008.
11. Juš Kocijan, "Survey of the methods used in patent on auto-tuning controllers", *Recent patents on electrical engineering*, vol. 1, no. 3, pp. 201-208, 2008.
12. Juš Kocijan, Bojan Likar, "Gas-liquid separator modelling and simulation with Gaussian process models", *Simulation modelling practice and theory*, vol. 16, no. 18, pp. 910-922, 2008.
13. Satja Lumbar, Damir Vrančič, Stanko Strmčnik, "Comparative study of decay ratios of disturbance-rejection magnitude optimum method for PI controllers", *ISA trans.*, vol. 47, no. 1, pp. 94-100, 2007.
14. Igor B. Mekjavić, Uroš Dobnikar, Stylianos N. Kounalakis, Bojan Musizza, Stephen S. Cheung, "The trainability and contralateral response of cold-induced vasodilatation in the fingers following repeated cold exposure", *Eur. j. appl. physiol. occup. physiol.*, vol. 104, no. 2, pp. 193-199, 2008.
15. Aljaž Stare, Nadja Hvala, Darko Vrečko, Stanko Strmčnik, "Primerjava strategij vodenja odstranjevanja dušikovih komponent na študijskem modelu čistilne naprave odpadnih voda", *Elektroteh. vestn.*, vol. 75, no. 4, pp. 183-188, 2008.
- Control (ISIC): parts of the IEEE Multi-conference on Systems and Control, San Antonio, Texas, 3-5 September 2008, [S. l.], Institute of Electrical and Electronics Engineers, 2008, pp. 1007-1012.
4. Matej Gašperin, Vladimir Jovan, Dejan Gradišar, "Decision support system for polymerization production plant using pPIs", In: *MED'08: proceedings of the 16th Mediterranean Conference on Control and Automation, June 25-27, 2008, Ajaccio, Corsica, France*, [S. l.], The IEEE Control Systems Society, 2008, pp. 547-551.
5. Marko Gerbec, Vladimir Jovan, Janko Petrovčič, "Operational reliability and safety risk assessment of fuel cell proton exchange membrane system", In: *34th ESReDA, 2nd ESReDa/ESRA Seminar on Supporting technologies for advanced maintenance information management: 13-14th May, 2008, San Sebastian, Spain*, [S. l., s. n.], 2008, 15 pp.
6. Giovanni Godena, Janez Tancek, Igor Steiner, Marko Svetina, "Design of a batch process control tool on the PLC platform", In: *Shaping the future of manufacturing, sharing and learning with the leaders in automation and manufacturing: WBF 2008 North American Conference, March 24-26, Dolce Valley, Philadelphia, Pennsylvania*, [S. l.], WBF-Forum for Automation and Manufacturing Professionals, 2008, 13 pp.
7. Dejan Gradišar, Vladimir Jovan, "Control system design for polymerization production plant", In: *Proceedings of the Control 2008 conference*, 8th Portuguese Conference on Automatic Control, 21-23 July 2008, Vila Real, Portugal, José Boaventura Cunha, ed., Vila Real, Universidade de Trás-os-Montes e Alto Douro, 2008, 6 pp.
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9. Vladimir Jovan, Dejan Gradišar, Sebastjan Zorzut, "Production control of a polymerization plant using a reduced set of control variables", In: *2008 International Conference on Cybernetics and Intelligent Systems: September 21-24, 2008, Chengdu, China*, Singapore, Institute of Electrical and Electronics Engineers, 2008, 6 pp.
10. Đani Juričić, Bojan Musizza, Matej Gašperin, Bogomir Vrhovec, Gregor Dolanc, Igor B. Mekjavić, Daniela Zavec Pavlinič, "System for evaluation of fire protective garments", In: *Magic world of textiles: book of proceedings*, 4th International Textile, Clothing & Design Conference [also] ITC&DC, October 5th to October 8th, 2008, Dubrovnik, Croatia, Zvonko Dragčević, ed., Zagreb, Faculty of Textile Technology, University of Zagreb, 2008, pp. 787-792.
11. Đani Juričić, Janko Petrovčič, Bojan Musizza, Uroš Benko, Gregor Dolanc, "Assessing the quality of electrical motors by means of integrated diagnostic techniques", In: *CM 2008 and MFPT 2008, The Fifth International Conference on Condition Monitoring and Machinery Failure Prevention Technologies*, Edinburgh, July 15-18, 2008, Oxford, UK, Coxmoor Publishing Company, cop. 2008, pp. 688-697.
12. Đani Juričić, Janko Petrovčič, Bojan Musizza, Gregor Dolanc, "Sistem za avtomatsko končno kontrolo elektromotorjev", In: *SLOTTRIB '08: zbornik predavanj Posvetovanja o tehnični diagnostiki, mazivih in alternativnih gorivih, Ljubljana, Slovenija, 18. november 2008*, Jože Vižintin, ed., Boris Kržan, ed., Bojan Podgornik, ed., Ljubljana, Slovensko društvo za tribologijo, = Slovenian Society of Tribology, 2008, pp. 43-54.
13. Jani Kleindienst, Đani Juričić, "Optimal selection of information terminals for data acquisition in manufacturing processes", In: *EUROSIM 2007: proceedings of the 6th EUROSIM Congress on Modelling and Simulation, 9-13 September 2007, Ljubljana, Slovenia. Vol. 2, Full papers*, 6th EUROSIM Congress on Modelling and Simulation, Ljubljana, Slovenia, 9-13 September, 2007, Borut Zupančič, ed., Rihard Karba, ed., Sašo Blažič, ed., Vienna, ARGESIM, cop. 2007, 6 pp.
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15. Teodora Miteva, Rodrigo Alvarez, Nadja Hvala, Dolores Kukanja, "Modeling of polyvinyl acetate polymerization processes for control purposes", In: *18th European Symposium on Computer Aided Process Engineering, June 1-4, 2008, Lyon, France: selected papers*, (Computer-aided chemical engineering, 25), Bertrand Braunschweig, ed., Xavier Joula, ed., Amsterdam [etc.], Elsevier Science, 2008, 6 pp.
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## REVIEW ARTICLES AND CHAPTERS IN BOOKS

1. Andrew Crossan, Roderick Murray-Smith, Stephen Brewster, Bojan Musizza, "Instrumented usability analysis for mobile devices", In: *Handbook of research on user interface design and evaluation for mobile technology*, Joanna Lumsden, ed., Hershey, New York, Information Science Reference, cop. 2008, pp. 927-944.
2. Jani Kleindienst, Đani Juričić, "Optimum selection of information terminals for production monitoring in manufacturing industries", *Stroj. vestn.*, vol. 54, no. 1, pp. 49-55, 2008.

## PUBLISHED CONFERENCE PAPERS

### Invited Papers

1. Juš Kocijan, "Gaussian process models for systems identification", In: *Proceedings of the 9th International PhD Workshop on Systems and Control, October 1-3, 2008, Izola, Simonov zaliv, Slovenia: young generation viewpoint*, Matej Gašperin, ed., Boštjan Pregelj, ed., Ljubljana, Institut Jožef Stefan, 2008, 8 pp.

### Regular papers

1. Uroš Benko, Janko Petrovčič, Bojan Musizza, Đani Juričić, "A system for automated final quality assessment in the manufacturing of vacuum cleaner motors", In: *Preprints of the 17th IFAC World Congress: Seoul, Korea, July 6-11, 2008*, 17th IFAC World Congress, Seoul, Korea, July 6-11, 2008, Myung Jin Chung, ed., Pradeep Misra, ed., Hyungbo Shim, ed., [Seoul], International Federation of Automatic Control, cop. 2008, pp. 7399.
2. Pavle Boškoski, Đani Juričić, Anton Urevc, Jože Vižintin, "Early gear pitting detection using multiple signal sources", In: *SLOTTRIB '08: zbornik predavanj Posvetovanja o tehnični diagnostiki, mazivih in alternativnih gorivih, Ljubljana, Slovenija, 18. november 2008*, Jože Vižintin, ed., Boris Kržan, ed., Bojan Podgornik, ed., Ljubljana, Slovensko društvo za tribologijo, = Slovenian Society of Tribology, 2008, pp. 67-78.
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- zaliv, Slovenia: young generation viewpoint, Matej Gašperin, ed., Boštjan Pregelj, ed., Ljubljana, Institut Jožef Stefan, 2008, 6 pp.
17. Teodora Miteva, Nadja Hvala, Rodrigo Alvarez, Dolores Kukanja, "Model-based optimization of a semi-batch industrial polymerization process", In: *Proceedings of the 10th International chemical and biological engineering conference: Braga, Portugal, 4-6 September 2008: ChemPor 2008*, Eugenio C. Ferreiro, ed., Manuel M. Mota, ed., [S.l., s.n.], 2008, 6 pp.
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