

DEPARTMENT OF COMPUTER AUTOMATION AND CONTROL E-2



Head:

Prof. Stanko Strmčnik

The Department of Computer Automation and Control is engaged in research, development, applications and education in the area of control technology. These activities are carried out in close cooperation with the Faculty of Electrical Engineering of the University of Ljubljana and the engineering company INEA. These three institutions make a consortium referred to as the “Technology vertical”, the aim of which is to merge expertise with knowledge transfer. To further stimulate cooperation with industry, a technology centre, referred to as the ConTech Centre, has been established within the Department.

Basic and applied research

In the area of **process diagnosis**, part of our work was devoted to robust detection of sensor faults by means of statistical tests. This approach allows relatively reliable detection of faults

despite the presence of modelling errors. Another key topic of interest was mathematical modelling appropriate for use in process diagnosis. Results confirmed that it is relatively easy to develop models that enable reliable detection of faults. Isolation, however, requires much more complex models, which must reflect the physical background of the processes under consideration. Quite a substantial part of our activity was devoted to tailoring the methods developed to meet practical limitations, especially those related to fault detection in thermal processes and electrical drives. It is important to mention that many activities in the area of process diagnosis were carried out in close cooperation with research groups from Germany, Czech Republic and Hungary.

In the area of **(model-based) process control and optimization**, research was concerned with general purpose control methods. Many issues in predictive control, further refinements of the magnitude optimum multiple integration (MOMI) tuning method for PID controllers, and development of non-linear control algorithms have been addressed. More specifically, the design of non-linear controllers, combining fuzzy gain scheduling and velocity linearization, was successfully applied within a 5FP project. Promising results were also achieved in a case study related to the control of grinding mills in the cement industry.

Part of the research was related to mathematical modelling, simulation and control design for waste-water treatment processes, an area that has been of interest for quite some time. Extensive simulation studies were performed on mathematical models of the Wastewater treatment plant Domžale-Kamnik. In addition, control algorithms were developed for the benchmark problem, issued in an international (COST) project. In this framework a feed-forward feedback strategy was employed by using a simplified mathematical model of the plant in the feed-forward path.

In the area of **computer integrated production in process industry**, work has been progressing along three lines. The first regards domain engineering, where a simple tool for automatic translation of specifications into PLC code was developed. The second line focused

on problems of scheduling in production processes. The emphasis was on appropriate problem formulation and analysis of usability of the existing scheduling tools. The third line addressed non-technical

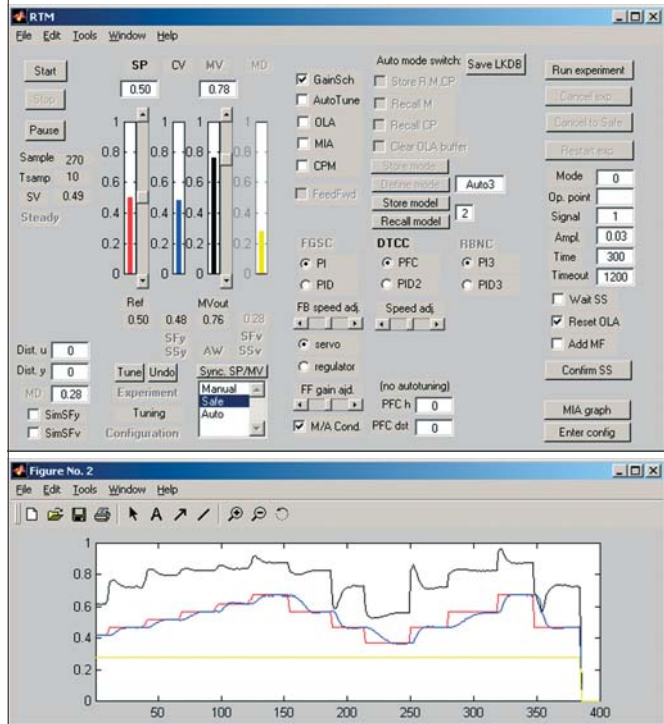


Figure 1: Testing the prototype of the Run-Time Module containing advanced control algorithms in a MATLAB environment

aspects of control technology. In particular, the role of “critical success factors” in implementing control/automation technology projects was extensively studied. A comprehensive study, including a historical overview of activities and suggestions for new research orientations in the area covered by IFAC TC “Social Impact of Automation” was carried out.

2001 marked the 15th anniversary of our department. We are very glad that in this very year our co-worker Damir Vrančić was awarded the Jožef Stefan Golden Emblem Prize for his Ph. D. thesis, and that the Jožef Stefan Institute Roll of Honour was awarded to one of our main industrial partners Cinkarna, Celje.

R & D projects

Our traditionally well developed cooperation with industry was even intensified in 2001.

A substantial part of our activities was devoted to developing products and tools for control systems. The bulk of the work was done on advanced control algorithms in the frame of ASPECT – the 5FP project (Fig. 1). Final users of the product will be three SME's, one from Slovenia, one from Greece and one from Bulgaria.

Cooperation with companies INEA and MITSUBISHI EUROPE in the area of design and development of special-purpose HW and SW modules progressed further. The emphasis was on development of new and refinement of existing algorithms for controlling plastic extruders.

An important part of our work was focused on the design of process supervision and control systems. These entail the development of a supervision system for detecting faults on electrical motors (for the company DOMEL, Železniki); developing control systems in titanium dioxide production (for Cinkarna, Celje); enhancing the control systems for PVA glues production (for MITOL, Sežana); developing a supervision and fault detection system for the incineration unit at a tyre plant (SAVA, Kranj) and developing a control system for a stainless steel slitter line in ACRONI steel production plant (sub-contractor of SIP-MOBIL, Šempeter) (Fig. 2).

In addition, two feasibility studies for the possible introduction of control/information systems were performed, one for METAL company, Ravne na Koroškem, and the other for IUV, Vrhnika.

Educational activities

Some members of the department give lectures and practical courses at the Faculty of Electrical Engineering, University of Ljubljana and the Polytechnic of Nova Gorica. They also act as supervisors of M.Sc and Ph.D. students. Special care was dedicated to post-qualification training for engineers from industry. In 2001, three one-week courses were organized in close co-operation with the Information Technologies Knowledge transfer Centre at the Institute.

Some outstanding publications in the past three years

1. Gregor Dolanc, Stanko Strmčnik, Janko Petrovčič, NO_x selective catalytic reduction control based on simple models. J. Process control. [Print ed.], 2001, vol. 11, pp. 35-51.
2. Đani Juričić, Olaf Moseler, Andrej Rakar. Model-based condition monitoring of an actuator system driven by a brushless DC motor. Control Engineering Practice. [Print ed.], 2001, vol. 9, pp. 545-554.
3. Damir Vrančić, Stanko Strmčnik, Đani Juričić. A magnitude optimum multiple integration tuning method for filtered PID controller. Automatica (Oxf.). [Print ed.], 2001, vol. 37, pp. 1473-1479.
4. Darko Vrečko, Nadja Hvala, Juš Kocijan, Mario Zec. System analysis for optimal control of a wastewater treatment benchmark. Water sci. technol., 2001, vol. 43, pp. 199-206.



UZ1 - ultrasonic distance measurement (uncoller diameter)
 UZ2 - ultrasonic distance measurement (recoiler diameter)
 UZ3 - ultrasonic distance measurement (exit loop level)
 POT - potentiometer (entry loop level)
 EM1 - DC drive - uncoller
 EM2 - DC drive - recoiler
 EM3 - DC drive - slitter
 AM - AC drive - scrap dropper
 IMP1 - inductive switch - angular velocity of uncoller motor
 IMP2 - inductive switch - angular velocity of recoiler motor
 IMP3 - inductive switch - angular velocity of slitter motor
 IMP4 - inductive switch - angular velocity of scrap dropper motor

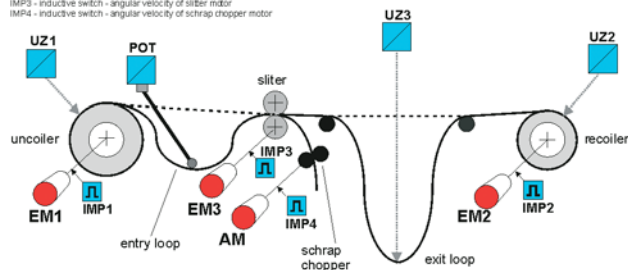


Figure 2: Control system for a stainless steel slitter line

The most important technological achievement in the past three years

1. SPAC-20 – Co-processor for High-End Control and Special Process Applications (J. Petrovčič, J. Grom, M. Štrubelj)

BIBLIOGRAPHY

ORIGINAL ARTICLES

- Gregor Bavdaž, Nadja Hvala, Juš Kocijan, Đani Juričić
Nelinearni algoritem za estimacijo stanj in identifikacijo parametrov šaržnega biološkega procesa
In: *Elektroteh. vestn.*, Vol. 68, pp. 57-63, 2001.
- Gregor Dolanc, Stanko Strmčnik, Janko Petrovčič
Vodenje procesa selektivne katalitske redukcije s pomočjo regulacijskega sistema z vgrajenimi matematičnimi modeli
In: *Elektroteh. vestn.*, Vol. 68, pp. 123-131, 2001.
- Gregor Dolanc, Stanko Strmčnik, Janko Petrovčič
No_x selective catalytic reduction control based on simple models
In: *J. process control*, Vol. 11, pp. 35-51, 2001.
- Nadja Hvala, Gregor Bavdaž, Juš Kocijan
Nonlinear state and parameter estimation in batch biological wastewater treatment
In: *Int. J. Syst. Sci.*, Vol. 32, pp. 145-156, 2001.
- Nadja Hvala, Mario Zec, Milenko Roš, Stanko Strmčnik
Design of a sequencing batch reactor sequence with an input load partition in a simulation-based experimental environment
In: *Water environ. res.*, Vol. 73, no. 2, pp. 146-153, 2001.
- Đani Juričić, Olaf Moseler, Andrej Rakar
Model-based condition monitoring of an actuator system driven by a brushless DC motor
In: *Control engineering practice*, Vol. 9, pp. 545-554, 2001.
- Nataša Pavšelj, Nadja Hvala, Juš Kocijan, Milenko Roš, Matjaž Šubelj, Gašper Mušič, Stanko Strmčnik
Experimental design of an optimal phase duration control strategy used in batch biological wastewater treatment
In: *ISA trans.*, Vol. 40, pp. 41-56, 2001.
- Damir Vrančič, J. Lieslehto, Stanko Strmčnik
Designing a MIMO PI controller using the multiple integration approach
In: *Process control qual.*, Vol. 11, pp. 455-468, 2001.
- Damir Vrančič, Stanko Strmčnik, R. Hanus
A new approach to analysing the windup phenomenon and antiwindup protection
In: *Int. J. Syst. Sci.*, Vol. 32, pp. 899-904, 2001.
- Damir Vrančič, Stanko Strmčnik, Đani Juričić
A magnitude optimum multiple integration tuning method for filtered PID controller
In: *Automatica (Oxf.)*, Vol. 37, pp. 1473-1479, 2001.
- Darko Vrečko, Nadja Hvala, Juš Kocijan, Mario Zec
System analysis for optimal control of a wastewater treatment benchmark
In: *Water sci. technol.*, Vol. 43, pp. 199-206, 2001.
- Darko Vrečko, Damir Vrančič, Đani Juričić, Stanko Strmčnik
A new modified Smith predictor: the concept, design and tuning
In: *ISA trans.*, Vol. 40, pp. 111-121, 2001.
- Dejan Dragan, Đani Juričić, Stanko Strmčnik
Prototip sodobnega nadzornega sistema na industrijskem procesu sežiganja odpadnih plinov
In: *Avtomatika (1999)*, Let. 3, pp. 38-43, 2001.
- Mičo Jančev, Janko Černetič
Vjerniki kvaliteta i "oni drugi"
In: *Bus. mag.*, 4, pp. 62-66, 2001.
- Vladimir Jovan
Center ARI - povezovalni člen med ponudniki in uporabniki storitev s področij avtomatizacije, robotizacije in informatizacije proizvodnje v Sloveniji
In: *R.I.A.*, Let. 4, pp. 4-6, 2001.
- Alenka Žnidaršič
Orodje Preactor: interaktivna podpora planerju pri završčanju opravil
In: *Avtomatika (1999)*, Let. 3, št. 12, pp. 39-41, 2001.

REVIEW ARTICLES, MONOGRAPHS AND SCIENTIFIC BOOKS

- Janko Černetič, Marjan Rihar, Stanko Strmčnik
Assessing the human orientation of new control technology: the example of Slovenia
In: *Computer-aided design, engineering, and manufacturing: systems techniques and applications*. Vol. V. The design of manufacturing systems, Cornelius T. Leondes, ed., Boca Raton [etc.], CRC Press, cop. 2001, pp. 5-47-5-51.
- Samo Gerkšič, Stanko Strmčnik
Distribution rejection tuning of a state-space predictive controller for a gasconditioning unit
In: *Advances in systems science(Electrical and computer engineering series)*, N. Mastorakis, ed., L.A. Pecorelli-Peres, ed., [S.l.], WSES Press, cop. 2001, pp. 169-174.
- Andrej Rakar, Đani Juričić
Reasoning approaches for fault isolation: a comparison study

- In: *Condition monitoring and diagnostic engineering management (COMADEM 2001): proceedings of the 14th International Congress*, 4-6 September 2001, Manchester, UK, Andrew G. Starr, ed., Raj B. K. N. Rao, ed., Amsterdam [etc.], Elsevier, 2001, pp. 193-200.
- Damir Vrančič, Stanko Strmčnik, M. Huba
Improving disturbance rejection by using a model-based approach
In: *Advances in systems science(Electrical and computer engineering series)*, N. Mastorakis, ed., L.A. Pecorelli-Peres, ed., [S.l.], WSES Press, cop. 2001, pp. 234-240.
 - Mina Žele, Đani Juričić
Robust detection of actuator faults in linear systems
In: *Advances in systems science(Electrical and computer engineering series)*, N. Mastorakis, ed., L.A. Pecorelli-Peres, ed., [S.l.], WSES Press, cop. 2001.

PUBLISHED CONFERENCE PAPERS

- Gregor Bavdaž, Juš Kocijan
Pregled pristopov k vodenje mlinov cementa
In: *Zbornik desete Elektrotehniške in računalniške konference ERK 2001*, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 217-220.
- Gregor Bavdaž, Juš Kocijan
Modeliranje mlina cementa
In: *Zbornik desete Elektrotehniške in računalniške konference ERK 2001*, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 255-258.
- Marcus Börner, Mina Žele, Rolf Isermann
Comparison of different fault detection algorithms for active body control components: automotive suspension system
In: *Proceedings of the ACC 2001 American Control Conference: June 25-27, 2001*, Arlington, Virginia, [S.l., s.n.], 2001, pp. 476-481.
- Dejan Dragan
Detekcija napak na osnovi modela: an example of analytical solution for industrial heat exchanger: primer analitične rešitve pri modeliranju industrijskega toplotnega izmenjevalnika
In: *Zbornik desete Elektrotehniške in računalniške konference ERK 2001*, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 275-278, 2001.
- Dejan Dragan, Đani Juričić
Model-based condition monitoring of a gas-gas heat exchanger
In: *Proceedings, European Control Conference ECC '01*, 4-7 September, 2001, Porto, Portugal, J.L. Martins de Carvalho, ed., F.A.C.C. Fontes, ed., M.d.R. de Pinho, ed., [S.l.], European Union Control Association, 2001, pp. 1384-1389.
- Dejan Dragan, Đani Juričić
Uporaba sodobnih konceptov nadzora na primeru industrijskega procesa sežiganja odpadnih plinov
In: *Zbornik druge konference Avtomatizacija v industriji in gospodarstvu*, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 139-144.
- Ivan Ganchev, Damir Vrančič
Auto-tuning of controllers in cascade systems using multiple integration method
In: *International Summer School of Automation*, June 10th-June 22nd 2001, Maribor, Slovenia(Reprints of the CEEPU CZ-103), Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Faculty of Electrical Engineering and Computer Science, 2001, pp. 30-35.
- Ivan Ganchev, Damir Vrančič
Auto-tuning of controllers in TITO systems using multiple integration method
In: *Proceedings, 15th International Conference on Systems for Automation of Engineering and Research (SAER-2001) and 3rd Seminar of the National Users Group of DELL Users Society*, September 21-23, 2001, St. Konstantin resort, Varna, Bulgaria, [S.l., s.n.], 2001, pp. 57-61.
- Samo Gerkšič, Stanko Strmčnik
State-space predictive control of a gas conditioning unit
In: *Proceedings, European Control Conference ECC '01*, 4-7 September, 2001, Porto, Portugal, J.L. Martins de Carvalho, ed., F.A.C.C. Fontes, ed., M.d.R. de Pinho, ed., [S.l.], European Union Control Association, 2001, pp. 54-59.
- Samo Gerkšič, Stanko Strmčnik
Disturbance rejection tuning of a state-space predictive controller for a gas conditioning unit
In: *Proceedings of the 5th WSES International Conference on Circuits, Systems, Communications and Computers (CSCC 2001) & Proceedings of the 3rd WSES International Conference on Mathematics and Computers in Physics (MCP 2001) & Proceedings of the 3rd WSES International Conference on Mathematics and Computers in Mechanical Engineering (MCME 2001): Rethymno, Greece, July 8-15, 2001*, Nikos Mastorakis, ed., [S.l.], WSES, IEEE, 2001, pp. 3331-3336.

11. Boštjan Hauptman
Uvajanje sistema za razvrščanje z upoštevanjem realnih kapacitet virov
In: Informacijska družba IS '01: zbornik A 4. mednarodne multi-konference, 22. do 26. oktober 2001, Ljubljana, Slovenija: proceedings A of the 4th International Multi-conference, 22-26th October 2001, Ljubljana, Slovenija, Cene Bavec, ed., Mojca Bernik, ed., Marko Bohanec, ed., Tomaž Domanjko, ed., Srečo Dragan, ed., Matjaž Gams, ed., Marko Grobelnik, ed., Marjan Heričko, ed., Dunja Mladenič, ed., Vladislav Rajkovič, ed., Ivan Rozman, ed., Franc Solina, ed., Maja Škrjanc, ed., Denis Trček, ed., Tanja Urbančič, ed., Ljubljana, Institut Jožef Stefan, 2001, pp. 37-40.
12. Boštjan Hauptman
Razvrščanje opravil z upoštevanjem realnih kapacitet virov v proizvodnem podjetju
In: Zbornik desete Elektrotehniške in računalniške konference ERK 2001, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. B, pp. 11-14.
13. Nadja Hvala, Darko Vrečko, Olga Burica, M. Stražar, Meta Levstek
Simulation study supporting wastewater treatment plant upgrading
In: Preprints, IWA 2nd World Water Congress Efficient Water Management - Making it Happen, Berlin, 15-19 October 2001, London, International Water Association, 2001, 8 pp.
14. Mičo Jančev, Janko Černetič
A socially appropriate approach for managing technological change
In: Preprints volume: SWIS'01, 8th IFAC Conference on Social Stability: The Challenge of Technology Development, September 27th-29th, 2001, Vienna, Austria, [S.I.], IFAC, 2001, pp. 79-84.
15. Vladimir Jovan
The integration of management levels in process industries
In: Proceedings, the Fifth Italian Conference on Chemical and Process Engineering, IChEaP-5 & 4th Conference on Process Integration, Modelling and Optimization for Energy Saving and Pollution Reduction, PRES'01, Florence, Italy, May 20-23, 2001, Sauro Pierucci, ed., Milano, AIDIC, 2001, Vol. 1, pp. 453-458.
16. Vladimir Jovan
Tehnološki center za avtomatizacijo, robotizacijo in informatizacijo proizvodnje - Center ARI
In: Zbornik druge konference Avtomatizacija v industriji in gospodarstvu, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 17-22.
17. Đani Juričić, Mina Žele
Model-based detection of actuator fault in the presence of modelling errors
In: Proceedings, European Control Conference ECC '01, 4-7 September, 2001, Porto, Portugal, J.L. Martins de Carvalho, ed., F.A.C.C. Fontes, ed., M.d.R. de Pinho, ed., [S.I.], European Union Control Association, 2001, pp. 814-819.
18. Gregor Kandare
Model-based software design for procedural process control with programmable logic controllers
In: Young generation's viewpoint: proceedings, The 2nd International PhD student workshop on systems and control, Balatonfüred, Hungary, 17-20 September, 2001, [s. l., s. n.], 2001, pp. 16-19.
19. Gregor Kandare, Giovanni Godena
Načrtovanje programske opreme za postopkovno vodenje procesov s programabilnimi logičnimi krmilniki
In: Zbornik desete Elektrotehniške in računalniške konference ERK 2001, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 241-244.
20. Gregor Kandare, Giovanni Godena, Pavel Blagotinšek, Tomaž Raznožnik
Faze specificiranja pri razvoju programske opreme za vodenje industrijskih procesov
In: Zbornik druge konference Avtomatizacija v industriji in gospodarstvu, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 300-305.
21. Jure Lukač, Peter Kosin, Matjaž Šubelj, Giovanni Godena, Vladimir Vrečko
Izvedba vodenja kompleksnih industrijskih procesov z integriranim sistemom SIEMENS SIMATIC PCS7 in BATCH flexible modulom
In: Zbornik druge konference Avtomatizacija v industriji in gospodarstvu, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 215-220.
22. Srečko Milanič, Stanko Strmčnik, Nadja Hvala, Davorka Šel, Rihard Karba
Developing a neural network model with scarce data - a case study
In: Shaping future with simulation: proceedings of the 4th International Eurosim 2001 Congress, Delft, the Netherlands, 26-29 June 2001, Arnold Heemink, ed., Delft, Delft University of Technology, 2001, pp. 1-6.
23. Andrej Rakar
Odkrivanje napak na procesu predpriprave dimnih plinov
In: Zbornik desete Elektrotehniške in računalniške konference ERK 2001, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 267-270.
24. Andrej Rakar, Đani Juričić, Miha Menard
Sistem za odkrivanje napak na polindustrijski napravi procesa predpriprave dimnih plinov
In: Zbornik druge konference Avtomatizacija v industriji in gospodarstvu, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 101-106.
25. Larry Stapleton, Janko Černetič, Georgina Holmes, Bill Brooke
Outline of an organisational adaptation support information systems (OASIS)
In: Preprints, 8th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems, Kassel, Germany, September 18-20, 2001, G. Johannsen, ed., [S.I.], IFAC, 2001, pp. 139-144.
26. Larry Stapleton, Janko Černetič, Donald Maclean, Robert Macintosh
Providing and R&D capability for small-medium sized firms in Europe: towards a unified model of technology deployment, innovation & organisational learning
In: Preprints volume: SWIS'01, 8th IFAC Conference on Social Stability: The Challenge of Technology Development, September 27th-29th, 2001, Vienna, Austria, [S.I.], IFAC, 2001, pp. 19-23.
27. Stanko Strmčnik, Janko Černetič
The time dimension of critical automation success factors
In: Preprints, 8th IFAC/IFIP/IFORS/IEA Symposium on Analysis, Design, and Evaluation of Human-Machine Systems, Kassel, Germany, September 18-20, 2001, G. Johannsen, ed., [S.I.], IFAC, 2001, pp. 133-137.
28. Dejan Tinta
Force control of hydraulic manipulator for standing-up
In: Young generation's viewpoint: proceedings, The 2nd International PhD student workshop on systems and control, Balatonfüred, Hungary, 17-20 September, 2001, [s. l., s. n.], 2001, pp. 55-58.
29. Damir Vrančić, Stanko Strmčnik, M. Huba
Improving disturbance rejection by using a model-based approach
In: Proceedings of the 5th WSES International Conference on Circuits, Systems, Communications and Computers (CSCC 2001) & Proceedings of the 3rd WSES International Conference on Mathematics and Computers in Physics (MCP 2001) & Proceedings of the 3rd WSES International Conference on Mathematics and Computers in Mechanical Engineering (MCME 2001): Rethymno, Greece, July 8-15, 2001, Nikos Mastorakis, ed., [S.I.], WSES, IEEE, 2001, pp. 7051-7057.
30. Darko Vrečko, Nadja Hvala, Olga Burica, Meta Stražar, Meta Levstek
Uporaba matematičnih modelov na področju čistilnih naprav
In: Zbornik druge konference Avtomatizacija v industriji in gospodarstvu, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 111-116.
31. Darko Vrečko, Nadja Hvala, Juš Kocijan
Wastewater treatment benchmark: What can be achieved with simple control?
In: [Conference preprints], ICA 2001, The 1st IWA Conference on Instrumentation, Control and Automation of Water and Wastewater Treatment and Transport Systems, Malmö, Sweden, June 3-7, 2001, Lund, Lund University, 2001, Vol. 1, pp. 221-228.
32. Darko Vrečko, Nadja Hvala, Juš Kocijan
Vodenje študijskega primera čistilne naprave
In: Zbornik desete Elektrotehniške in računalniške konference ERK 2001, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 233-236.
33. Mina Žele, Marcus Börner
Odkrivanje napak v sistemu avtomobilskega vzmetenja z metodo glavnih komponent
In: Zbornik druge konference Avtomatizacija v industriji in gospodarstvu, 5.in 6. april 2001, Maribor, Slovenija: [zbornik Društva avtomatikov], Boris Tovornik, ed., Nenad Muškinja, ed., Maribor, Društvo avtomatikov Slovenije, 2001, pp. 107-110.
34. Mina Žele, Đani Juričić
Robust detection of actuator faults in linear systems
In: Proceedings of the 5th WSES International Conference on Circuits, Systems, Communications and Computers (CSCC 2001) & Proceedings of the 3rd WSES International Conference on Mathematics and Computers in Physics (MCP 2001) & Proceedings of the 3rd WSES International Conference on Mathematics and Computers in Mechanical Engineering (MCME 2001): Rethymno, Greece, July 8-15, 2001, Nikos Mastorakis, ed., [S.I.], WSES, IEEE, 2001, pp. 5181-5186.
35. Mina Žele, Đani Juričić
Statistični test za odkrivanje napak izvršnega sistema
In: Zbornik desete Elektrotehniške in računalniške konference ERK 2001, 24. - 26. september 2001, Portorož, Slovenija, Baldomir Zajc, ed., Ljubljana, IEEE Region 8, Slovenska sekcija IEEE, 2001, Zv. A, pp. 271-274.

TECHNICAL REPORTS

- B. Burkeljč, Giovanni Godena
Sistem vodenja kontinuirnega dela procesnega laboratorija (US delovno poročilo, 8398), 2001.
- Gregor Dolanc
Report on multifaceted model and knowledge database implemented in Matlab: ASPECT project (US delovno poročilo, 8454), 2001.
- Gregor Dolanc, Samo Gerkšič, Stanko Strmčnik, Juš Kocijan
Final run time module requirements: ASPECT project (US delovno poročilo, 8420), 2001.
- Gregor Dolanc, Samo Gerkšič, Stanko Strmčnik, Juš Kocijan, Damir Vrančić, Igor Škrjanc, Sašo Blažič, Mina Žele, Đani Juričić, Mincho Hadjinski, Kosta Boshnakov, Nikolinka Christova, Anna Stathaki, Robert King

- Specifications for RTM: ASPECT project (IJS delovno poročilo, 8422), 2001.
- Gregor Dolanc, Juš Kocijan, Damir Vrančič, Mincho Hadjinski, Kosta Boshnakov, Nikolinka Christova, Anna Stathaki, Robert King
Specifications for control algorithms: ASPECT project (IJS delovno poročilo, 8421), 2001.
 - Samo Gerškšič
Report on PCSA testing in Matlab and report on RTM testing in Matlab (ASPECT project) (IJS delovno poročilo, 8495), 2001.
 - Samo Gerškšič, Gregor Dolanc, Mincho Hadjinski, Nikolinka Christova, Ekaterina Ivanova, Ivaylo Koleshanov
Report on supervisor and control performance monitor implementation in MATLAB code: ASPECT project (IJS delovno poročilo, 8472), 2001.
 - Giovanni Godena, Matjaž Šubelj, Peter Kosin, J. Lukač, Tomaž Raznožnik, Pavel Blagotinšek, Slavko Cankar, Vladimir Vrečko, Dejan Ketiš, Z. Marcen
Predmešanje in razklop v podjetju Cinkarna Celje d.d.: specifikacija zahtev in funkcij ter koncept sistema vodenja, verzija 3.0 (IJS delovno poročilo, 8251), 2001.
 - Vladimir Jovan
Ocena upravičenosti investicij v racionalizacijo porabe energije v Mitol d.d. (IJS delovno poročilo, 8351), 2001.
 - Vladimir Jovan, Marjan Rihar, Alenka Žnidaršič
Učinkovito informacijsko spremljanje in upravljanje proizvodnje v lesno-predelovalnem podjetju (Zaključno poročilo projekta), Pivka, Razvojni center za lesarstvo, 2001.
 - Juš Kocijan, Damir Vrančič, Robert E. King, Anna A. Stathaki, Fotis N. Koumboulis, Fotis Skiadas, Mincho Hadjinski, Ventsislav Asenov, Kosta Boshnakov
Report on control algorithm agents implementation in MATLAB code: ASPECT project (IJS delovno poročilo, 8471), 2001.
 - Bojan Likar, Juš Kocijan
Primerjava robustnosti dveh metod nelinearnega vodenja (IJS delovno poročilo, 8474), 2001.
 - Borut Likar, Giovanni Godena, Juš Kocijan
Eksperimentalno okolje za vodenje podprocesa priprave plina v realnem času iz okolja MATLAB-SIMULINK (IJS delovno poročilo, 8463), 2001.
 - Andrej Rakar, Đani Juričič
Zgodnje odkrivanje napak na napravi Huetlin HKC 200/50 v Leku d.d.: možnostna študija (IJS delovno poročilo, 8346-zaupno), 2001.
 - Stanko Strmčnik, Janko Černetič
Kvantitativna analiza publiciranja na področju "Social impact of automation" (IJS delovno poročilo, 8465), 2001.
 - Damir Vrančič, Janko Petrovič, Đani Juričič, Stanko Strmčnik
Self-learning adaptive PLC controller (SLAP-C): library of modules (IJS delovno poročilo, 8526, confidential), 2001.
 - Damir Vrančič, Janko Petrovič, Đani Juričič, Stanko Strmčnik
Self-learning adaptive PLC controller: functional description (IJS delovno poročilo, 8527, confidential), 2001.

PATENT

Patent granted

- Matjaž Mikoš, Janko Petrovič, Mojca Escorza Spazzapan
Postopek in naprava za merjenje elementov dinamike gibanja in sil, ki delujejo na posamezne delce v naravnem okolju, zlasti v prodnatih plavinah v vodotokih Ljubljana, Urad Republike Slovenije za intelektualno lastnino, 30.04.2001.

THESES

B. Sc. Theses

- Benjamin Čokan: The assessment of velocity-based linearization for non-linear control and state observer (Juš Kocijan)
- Miha Menard: Diagnostic system for a flue gas conditioning technological process (Andrej Rakar)
- Janez Petrič: The comparison of optimisation methods for biological wastewater treatment plants modelling (Juš Kocijan)
- Aleš Regent: Airing and shading control of the greenhouse (Damir Vrančič)
- Jože Rotar: Requirements definition for a building security system (Juš Kocijan)
- Sebastijan Zorzut: Realisation of a Control System for Gas separation Subprocess using Siemens SIMATIC PCS7 Development Environment (Giovanni Godena)

M. Sc. Theses

- Gregor Bavdaž: The optimisation of mill systems operation in cement industry (Juš Kocijan)
- Robert Marinšek: Human-centered design of information technology with an example of human-machine interface for control of batch production (Janko Černetič, Stanko Strmčnik)

MESS SUPPORTED RESEARCH AND DEVELOPMENT GRANTS AND CONTRACTS

- System for Electromotors Final Quality Checking
Dr. Mina Žele

Research program

- Computer Automation and Control
Prof. Stanislav Strmčnik

INTERNATIONAL PROJECTS

- Advanced Control Algorithms for Programmable Logic Controllers (PLCs) ASPECT; IST-1999-56407 (CRAFT), 5. FP
EC; Dr. Zoran Marinšek, INEA d. o. o., Domžale, Slovenia
Prof. Stanko Strmčnik
- Multi-Agent Control: Probabilistic Reasoning, Optimal Coordination, Stability Analysis and Controller Design for Intelligent Hybrid System
MAC; HPRN-CT-1999-00107, (Research Training Network), 5. FP
EC; Dr. Roderick Murray-Smith, University of Glasgow, Department of Computing Science, Glasgow, Great Britain
Prof. Juš Kocijan
- Optimal Management of Waste - Water Systems
COST 624, 3311-01-837046
EC
Dr. Nadja Hvala
- Analysis and Control of SBR Waste - Water Treatment Systems
Prof. Stefano Marsili - Libeli, University of Florence, Department of Systems and Computers, Firenze, Italy
Dr. Nadja Hvala
- Intelligent Hierarchical Control of Wastewater Treatment Plants
Prof. Robert E. King, Computer Technology Institute, Patras, Greece
Prof. Juš Kocijan
- Advanced Tools for Control and Monitoring of Complex Systems
Dr. Tatiana Guy, Institute of Information Theory and Automation, Prague, Czech Republic
Dr. Đani Juričič
- Nonlinear Model-based Condition Monitoring for Chemical and Process Industries
Dr. Katalin Hangos, Computer and Automation Research Institute, Hungarian Academy of Sciences, Budapest, Hungary
Dr. Đani Juričič

NEW CONTRACTS SIGNED

- Testing set-up "Krogograf"
Kolektor, d.o.o., Idrija
Dr. Vladimir Jovan
- Prototype of a system for automatic control of electromotor's quality
Domel, d.d., Železniki
Dr. Mina Žele
- Control of metal sheet cutting line
Sip Mobil, d. o. o., Šempeter v Sav. dolini
Dr. Gregor Dolanc
- Computer subsystem for final control of vacuum cleaner motor based on vibration analysis
Domel, d. d., Železniki
Dr. Đani Juričič

VISITORS FROM ABROAD

- King Robert, prof. dr., University of Patras, Greece, 11.1.2001
- Stathaki Anna, dr., Computer Technology Institute, Athens, Greece, 11.1.2001

3. Dmitrii G. Luchinsky, dr., Department of Physics, University of Lancaster, Lancaster, Great Britain, 12.4.2001
4. Juan Francisco Santa Pau Valls, Polytechnic University, Valencia, Spain, 9.7.-18.8.2001
5. King Robert, prof. dr., University of Patras, Greece, 9.-14.7.2001
6. Stathaki Anna, dr., Computer Technology Institute, Atene, Greece, 9-14.7.2001
7. Valentine-Guy Tatiana, Czech Academy of Sciences, Prague, Czech Republic, 15.-22.9.2001
8. Grancharova, Alexandra, dr., Bulgarian Academy of Sciences, Sofia, Bulgaria 26.9.2001
9. Palus Milan, dr., Czech Academy of Sciences, Prague, Czech Republic, 23.-31.10.2001
10. Juelich Jutta, Mitsubishi Electric Europe, Rattingen, Germany, 11.-12.12.2001
11. Mischitz Peter, Mitsubishi Electric Europe, Rattingen, Germany, 11.-12.12.2001

ORGANIZATION OF CONFERENCES AND MEETINGS

1. Production management and information systems: continuing education (specialisation) course in Control Technology, Ljubljana, February 12-16, 2001
2. Automation and information systems projects: continuing education (specialisation) course in Control Technology, Ljubljana, April 9-13, 2001
3. organization of the "Multi-agent control: probabilistic reasoning, optimal coordination, stability analysis and controller design for intelligent hybrid systems Summer School", Kranjska gora, September 16-21, 2001
4. Building blocks for computer automation: continuing education (specialisation) course in Control Technology, Ljubljana, October 15-19, 2001

STAFF

Researchers

1. Dr. Janko Čermetič
2. Dr. Nadja Hvala
3. Dr. Vladimir Jovan
4. Dr. Đani Juričić
5. Prof. Rihard Karba
6. Prof. Juš Kocijan**
7. Prof. Drago Matko*
8. Dr. Janko Petrovčič**
9. **Prof. Stanislav Strmčnik**, Head**

10. Dr. Damir Vrančič
11. Prof. Borut Zupančič*

Postdoctoral associates

12. Dr. Gregor Dolanc
13. Dr. Samo Gerškšič**
14. Dr. Andrej Rakar**
15. Dr. Mina Žele
16. Dr. Alenka Žnidaršič***

Postgraduates

17. Dejan Dragan, M. Sc.
18. Boštjan Hauptman, M. Sc.
19. Gregor Kandare, B. Sc.
20. Dejan Tinta, B. Sc.
21. *Dr. Marko Valjavec, left 01.09.2001*
22. Darko Vrečko, B. Sc.
23. Sebastjan Zorzut, B. Sc.

Technical officers

24. Giovanni Godena, B. Sc.
25. Dr. Zoran Marinšek***
26. *Matjaž Šubelj, M. Sc., pause 31.12.1998*

Technical and administrative staff

27. Janez Grom
28. Maja Janežič
29. Miroslav Štrubelj

* Full-time faculty member

** Part-time faculty member

*** Member of industrial or other organisation