8th European Workshop on Advanced Control and Diagnosis 2010

ACD 2010 Programme

Editors: Silvio Simani, Marcello Bonfè
Paolo Castaldi & Nicola Mimmo

18 – 19 November 2010

Department of Engineering
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Welcome to ACD2010

On behalf of the International Programme Committee and the Local Organising Committee of the *8th Workshop on Advanced Control and Diagnosis, ACD2010*, it is our pleasure to welcome you to this event, help at the Department of Engineering of the University of Ferrara, Italy, on 18th and 19th November 2010.

ACD2010, organised by the Department of Engineering of the University of Ferrara, Ferrara, Italy, brings together academics and engineers in control engineering and computer science. The workshop highlights some recent results in the development of methods, and tools, as well as some prototypes that are of particular interest to academics and engineers in automatic control and diagnosis. Another aim of the ACD2010 is to enhance cross-cultural exchange, facilitate co-operation among potential partners, as well as to promote student and teacher exchange and co-supervision of doctorates.

The programme includes four plenary talks, and twelve regular sessions in three parallel tracks. The plenary talks give participants the opportunity to share and draw on the knowledge and experience of internationally acknowledged experts in new perspectives for research in fault tolerant control, design and evaluation of reconfiguration-based fault tolerance using the lattice of system configurations, developments in bilinear systems modelling and control with industrial applications, and norm-based point of view for fault diagnosis, with application to aerospace missions.

During the workshop, two awards, the best regular paper (application or theoretical), and the best student paper, funded by the Consorzio Ferrara Ricerche of the University of Ferrara, will be granted to scientists and students.

We wish you a pleasant stay in Ferrara, and a fruitful participation to ACD2010.

Dr. Silvio Simani & Dr. Marcello Bonfè

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Co-sponsoring Organisations

Department of Engineering, University of Ferrara (ENDIF-UNIFE), Consorzio Ferrara Ricerche, University of Ferrara.

Supports

The Intelligent Control and Diagnosis (ICD, http://www.icd.cran.uhp-nancy.fr/) working group founded in 1998, leads to new developments and applications in the field of automatic control and fault diagnosis. The aim of the ICD working group is to explore research opportunities in the direction of Fault Diagnosis and Fault-tolerant Control for technical systems. ICD Research activities can be summarized as follows:

- Development of advanced methods with applications to automatic control and fault detection and isolation (FDI);
- Design of FTC strategy providing an optimal performance of the reconfigured system according to the reliability measure in order to ensure the dependability of the system and the human safety;
- Investigation of typical application areas and technology transfer to industrial areas of special interest for control and diagnosis of technical systems. The domains of application concern different types of systems such as embedded systems, distributed systems, networked systems.

Within this working group, the members co-operate in different ways, one important one are joint European projects. The aim for the future is to initiate more of such projects, especially in co-operation with industry and to tackle with advanced methods in Fault Tolerant Control (FTC) framework in order to improve the human safety and dependability of the system. The chairs are the Prof. C. Aubrun and the Prof. D. Theilliol. The members and partners are:

- Gerhard-Mercator-Universitaet Duisburg, Germany
- Centre de Recherche en Automatique de Nancy, France
- GIPSA-Lab Grenoble, France
- University of Karlsruhe, Germany
- Control Theory and Applications Centre, Coventry University, United Kingdom
- Institute of Control and Computation Engineering, University of Zielona Gora, Poland
- Department of Engineering, University of Ferrara, Italy
- Automatic Control Department, Universidad Politecnica de Cataluna, Spain
- Engineering Department, The University of Hull, United Kingdom

Useful Information

Registration Desk

The desk located on the ground floor of the Department of Engineering main building will be opened on 18th November from 8:30 to 10:30 am, and on 19th November from 8:30 to 10:00 am. All attendees must register and will receive a badge together with the registration package.

Internet Access

All participants have access to the free wireless Internet connection of the Department of Engineering, by using the user name and password personal codes provided at the registration desk. Due to the new regulations, personal codes will be unique for each participant, and issued by filling a suitable request form that must be filled with personal ID information (passport, identity card).

Lunches, Special Sessions, Farewell Party

Two buffet lunches and two coffee breaks will take place in the hall at the ground floor of the Department of Engineering (conference venue) of the University of Ferrara.

Gala Dinner

The dinner, together with the planned social activities, will be held at Ferrara's Castello Estense, which will be connected by two buses departing from the Department of Engineering (conference

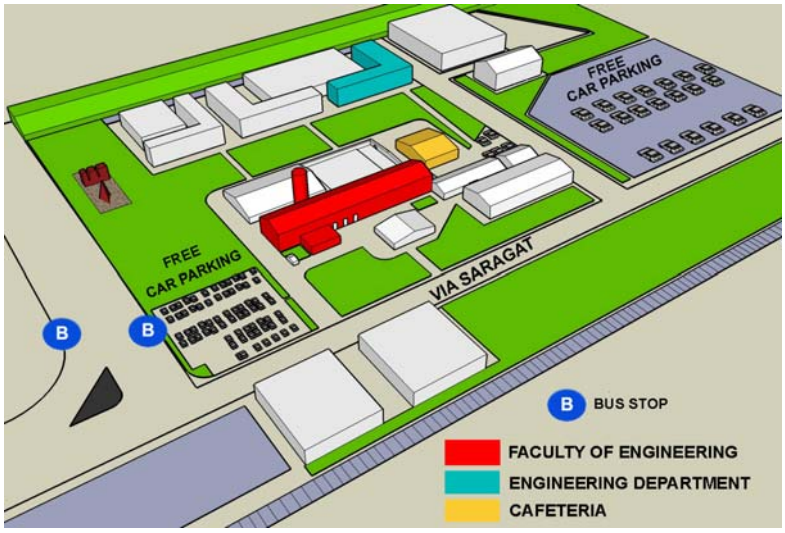
venue) at 17:30 of the 18th November 2010. The Castle is located in the city centre of Ferrara, and within walking distance from the suggested accommodations.

Best Paper Awards

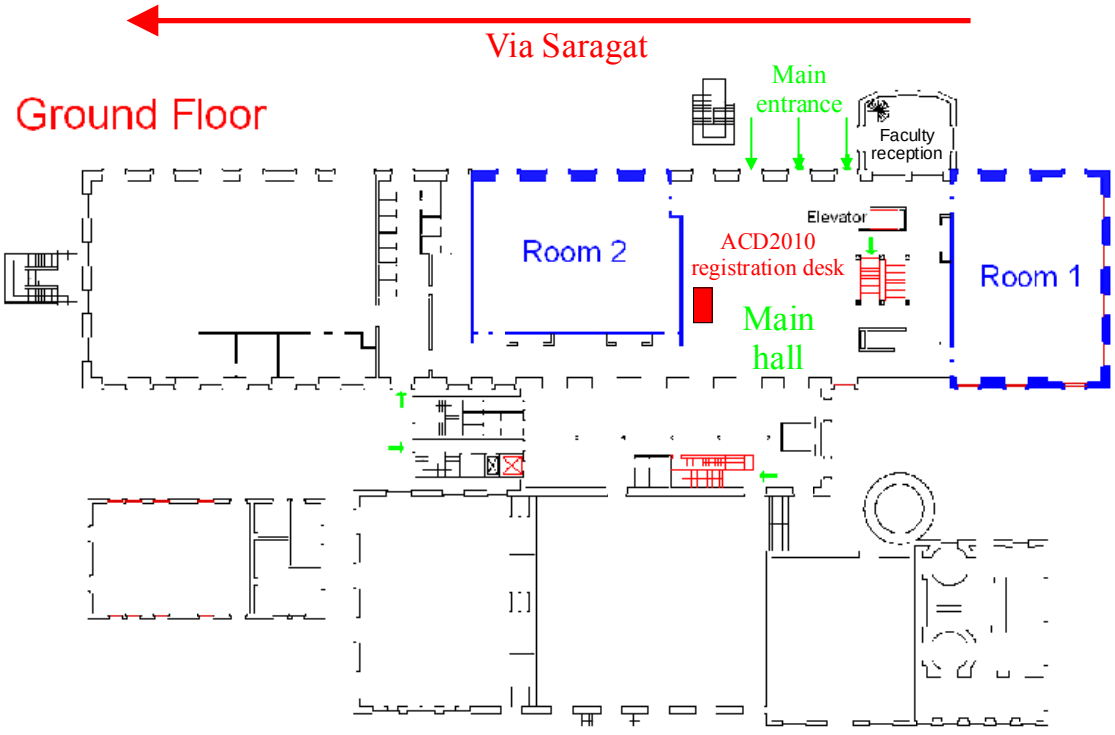
During the workshop, two awards, the best regular paper (application or theoretical), and the best student paper, funded by the Consorzio Ferrara Ricerche of the University of Ferrara, will be granted to scientists and students.

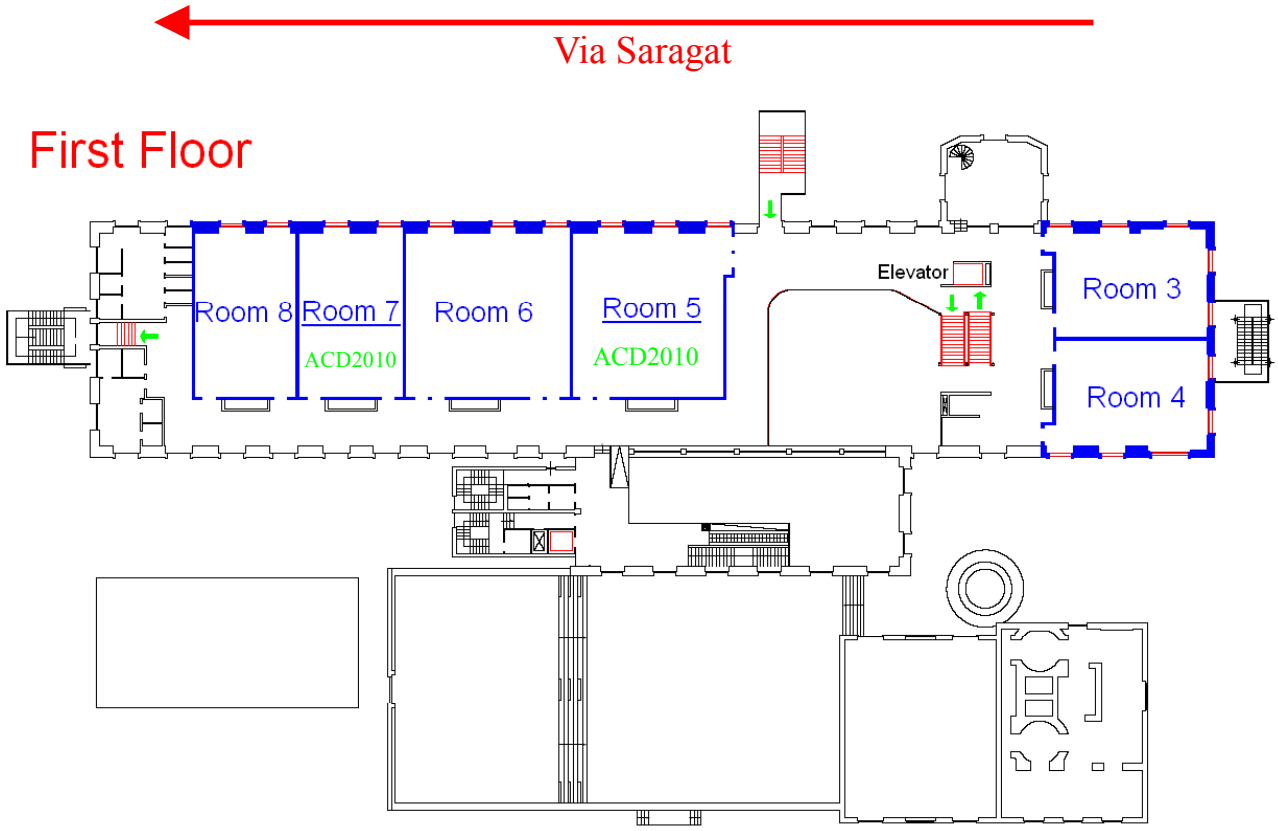
Location

Workshop Venue: Engineering Department, Via Saragat 1. 44123 - Ferrara (FE). Ph.: 0532974800

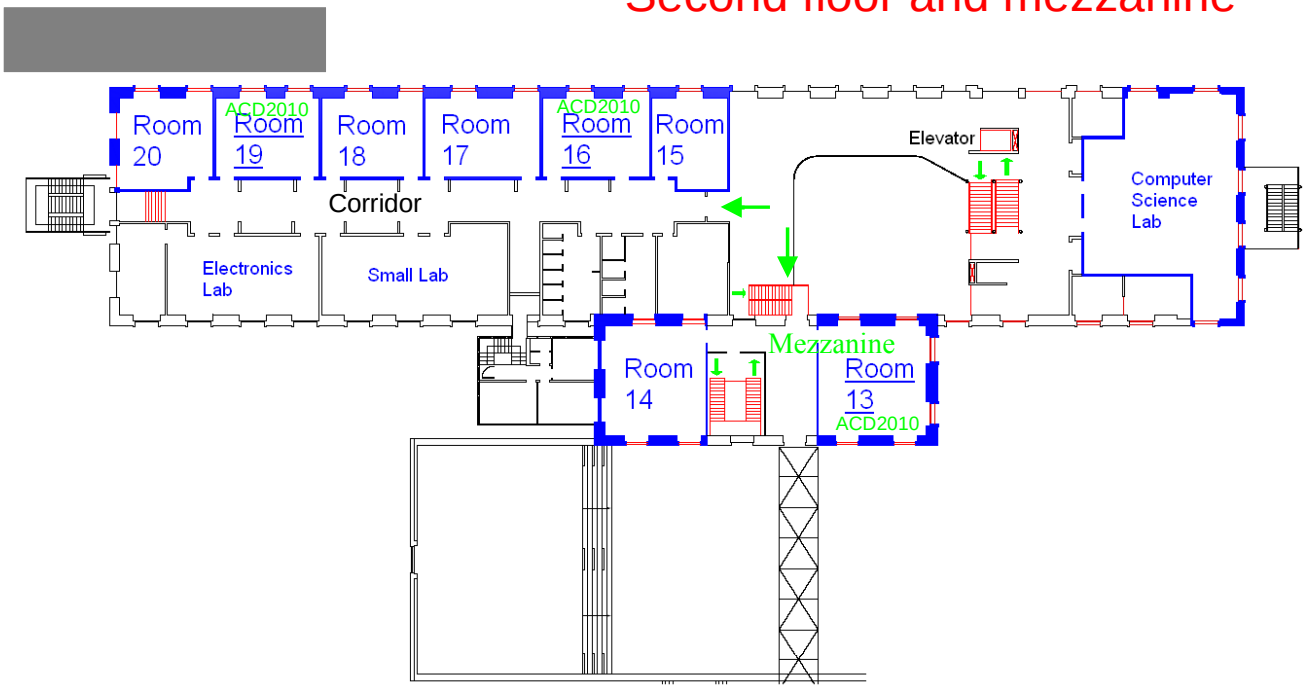


Workshop Floor Plan





Second floor and mezzanine



Outline Programme

Thursday, 18th November 2010

8:15 – 9:00	**Day #1 Registration** (Hall, registration desk, ground floor level)		
9:00 – 9:15	**Opening Ceremony** (Room 7)		
9:15 – 10:00	**Plenary Session ThP1** "New Perspectives for Research in Fault Tolerant Control" Prof. Ron J Patton, University of Hull, Hull, UK. (Room 7)		
10:00 – 10:45	**Plenary Session ThP2** "Issues on fault identification and fault tolerant control for nonlinear dynamic processes" Prof. Keith Burnham, Coventry University, Coventry, UK. (Room 7)		
10:45 –11:15	**Coffee Break** (Hall, ground floor level)		
11:20 – 13:00	**Regular Session ThA1** Aircraft Fault Diagnosis and Reconfiguration (Room 16)	**Regular Session ThA2** Process Control (Room 19)	**Regular Session ThA3** System Monitoring (Room 20)
13:15 – 14:30	**Lunch Buffet** (Hall, ground floor level)		
14:45 – 15:30	**Plenary Session ThP3** "Design and Evaluation of Reconfiguration-based Fault Tolerance using the Lattice of System Configurations" Prof. Marcel Staroswiecki, Lille University, Lille, France. (Room 5)		
15:40 – 17:20	**Regular Session ThB1** Computational Intelligence Methods (Room 16)	**Regular Session ThB2** Robust Model-Based Fault Detection (Room 19)	**Regular Session ThB3** Fault Tolerant Control (Room 20)
17:30	*Two buses are departing from Engineering Department at 17:30* ***Social event for registered participants only with full registration package (Euro 200 regular and Euro 150 student)***		
18:00 – 19:00	**Social Event #1** (Castello Estense Museum)		
19:00 – 20:00	**Special Session** (Castello Estense Wine Tasting)		
20:00 – 23:00	**Gala Dinner** (Castello Estense Imbarcadero Rooms)		

Friday, 19th November 2010

8:15 – 9:00	**Day #2 Registration** (Hall, registration desk, ground floor level)		
9:00 – 9:45	**Plenary Session FrP1** "A norm-based point of view for fault diagnosis: Application to aerospace missions" Prof. David Henry, Bordeaux 1 University, Talence cedex, France (Room 13)		
9:50 – 11:30	**Regular Session FrA1** Design for Reliability and Safety (Room 13)	**Regular Session FrA2** Informatics for Control (Room 16)	**Regular Session FrA3** Fault Detection and Isolation (Room 19)
11:30 –11:50	**Coffee Break** (Hall, ground floor level)		
12:00 – 13:40	**Regular Session FrB1** Advanced Applied Fault Diagnosis (Room 13)	**Regular Session FrB2** Signal Processing Techniques (Room 16)	**Regular Session FrB3** Adaptive and Predictive Control (Room 19)
13:45 – 14:50	**Lunch Buffet** (Hall, ground floor level)		
14:50 – 15:30	**ACD Directorate Meeting** (Room 16)		
15:45 – 16:15	**Closing Ceremony** (Room 13)		
16:30 – 19:00	**Social Activities…** *Guided Tour: Registered Participant Only*		

Session and Talk Programme

Thursday, 18th November 2010

Plenary Session ThP1
Chair: Silvio Simani
Room 7

9:15-10:00 "New Perspectives for Research in Fault Tolerant Control"
Prof. Ron J Patton, University of Hull, Hull, UK

Plenary Session ThP2
Chair: Vicenc Puig
Room 7

10:00-10:45 "Issues on fault identification and fault tolerant control for nonlinear dynamic processes"
Prof. Keith Burnham, Coventry University, Coventry, UK

Aircraft Fault Diagnosis and Reconfiguration ThA1
Chair: Paolo Castaldi
Co-Chair: Nicola Mimmo
Room 16

11:20 – 11:40 **2.** Aircraft Sensor Fault Detection and Accommodation by Some Conventional Controllers
Emre Kiyak and Fikret Caliskan

11:40 – 12:00 **3.** Performance Comparison of Different Types of Controllers for the Control of the Pitch Angle of an Aircraft
Gulay Iyibakanlar and Emre Kiyak

12:00 – 12:20 **35.** Fault Tolerant Control Schemes for Nonlinear Models of Aircraft and Spacecraft: Preliminary Results
Paolo Castaldi, Nicola Mimmo and Silvio Simani

12:20 – 12:40 **36.** Robust Model Matching for Geometric Fault Detection Filters: A Commercial Aircraft Example
Jozsef Bokor, Peter Seiler, Balint Vanek, Gary J. Balas

12:40 – 13:00 **54.** Comparison on Control Allocation Methods For The High Altitude Performance Demonstrator
V. Scordamaglia, M. Mattei, C. Calabrò, A. Sollazzo, F. Corraro

Process Control ThA2
Chair: Antonio Visioli
Co-Chair: Ralf Stetter
Room 19

11:20 – 11:40 **5.** Optimization of a Water For Injection Control System for a Pharmaceutical Plant
Antonio Visioli, Massimiliano Ammannito, Michele Caselli and Marco Incardona

11:40 – 12:00 **7.** Smith Predictor Based Control of Continuous-Review Perishable Inventory Systems with a Single Supply Source
Przemyslaw Ignaciuk and Andrzej Bartoszewicz

12:00 – 12:20 **12.** Modelling of positive displacement pumps for monitoring, planning, control and diagnosis
Stefan Kleinmann, Muhammad Fairusz Abdul Jalal and Ralf Stetter

12:20 – 12:40 **18.** Validation of A New Time Delay Estimation Method for Control Performance Monitoring
Markus Stockmann, Robert Haber and Ulrich Schmitz

12:40 – 13:00 **63.** HVAC system energy consumption dependency on control set-point selection
Ivan Zajic, Tomasz Larkowski, Dean Hill and Keith Burnham

System Monitoring ThA3
Chair: Didier Theilliol
Co-Chair: Sergio Chiesa
Room 20

11:20 – 11:40 **19.** Estimation and prediction of global radiation by Meteosat image processing
Ali Zaher, Thiery Frédérik, Yao N'Goran, Adama Traore

11:40 – 12:00 **37.** System Programmable Logic Controller Computer Aided Development Procedure
Sergio Chiesa, Sabrina Corpino and Giovanni Medici

12:00 – 12:20 **41.** Improvement of the Sensitivity of T^2 Quality Control Charts by Grouping of Variables
Thomas Friebel and Robert Haber

12:20 – 12:40 **51.** Reconfiguration of over-actuated consecutive-k-out-of-n: F systems based on Bayesian Network Reliability Model
Philippe Weber, Christophe Simon and Didier Theilliol

12:40 – 13:00 **53.** Communication Sequence Design in Networked Control Systems With Communication Constraints: A Graphic Approach
Sinuhe Martinez-Martinez, Hossein Hashemi-Nejad and Dominique Sauter

Plenary Session ThP3
Chair: Jozef Korbicz
Room 5

14:45-15:30 "Design and Evaluation of Reconfiguration-based Fault Tolerance using the Lattice of System Configurations"
Prof. Marcel Staroswiecki, Lille University, Lille, France

Computational Intelligence Methods ThB1
Chair: Luciano Blasi
Co-Chair: Marcel Luzar
Room 16

15:40 – 16:00 **11.** Control of Independent Mobile Robots by Means of Advanced Monitoring
Lothar Seybold, Jaroslaw Krokowicz, Krzysztof Patan, Ralf Stetter and Anderas Paczynski

16:00 – 16:20 **17.** An Application of Model Based Fault Detection in Power Plants
Goran Kvascev, Predrag Tadic and Zeljko Djurovic

16:20 – 16:40 **30.** A GMDH Toolbox For Neural Network-Based Modelling
Marcel Luzar and Marcin Witczak

16:40 – 17:00 **32.** Fault detection and accommodation of the boiler unit using state space neural networks

Andrzej Czajkowski and Krzysztof Patan

17:00 – 17:20 **39.** Flight Path Optimisation Using Primitive Manoeuvres: A Particle Swarm Approach
Luciano Blasi, Simeone Barbato and Massimiliano Mattei

Robust Model-Based Fault Detection ThB2
Chair: Miroslav Šimandl
Co-Chair: Andrea Cristofaro
Room 19

15:40 – 16:00 **1.** Design of Robust Fault Detection Filters for Plants with Quantized Information
Maria Letizia Corradini, Andrea Cristofaro, Roberto Giambò, Silvia Pettinari

16:00 – 16:20 **4.** Fault detection and estimation in networked control systems
Ignacio Peñarrocha and Roberto Sanchis

16:20 – 16:40 **8.** Smoothing in Multiple Model Change Detection for Stochastic Systems
Ivo Puncochar, Jindrich Dunik and Miroslav Simandl

16:40 – 17:00 **10.** Communication Gains Design in a Consensus Based Distributed Change Detection *Algorithm Nemanja Ilic and Srdjan Stankovic*

17:00 – 17:20 **60.** Diagnostics of distributed faults in ball bearings by means of vibration cyclostationary indicators *Gianluca D'Elia, Simone Delvecchio, Marco Cocconcelli and Giorgio Dalpiaz*

Fault Tolerant Control ThB3
Chair: Nicolas Langlois
Co-Chair: Marcin Witczak
Room 20

15:40 – 16:00 **9.** Predictive fault-tolerant control of Takagi-Sugeno fuzzy systems
Lukasz Dziekan and Marcin Witczak

16:00 – 16:20 **20.** Advanced and Predictive Diagnosis on the Example of Pump Systems
Stefan Kleinmann, Anna Dabrowska, Domenico Leonardo, Ralf Stetter and Agathe Koller-Hodac

16:20 – 16:40 **27.** Equality constraints in sensor faults reconfigurable control design
Dusan Krokavec and Anna Filasova

16:40 – 17:00 **28.** Set-point reconfiguration in case of severe actuator fault
Boumedyen Boussaid, Christophe Aubrun and Naceur Abdelkrim

17:00 – 17:20 **49.** An Efficient Algorithm For Fault Tolerant Sensor Network Design
Firas Rouissi, Ghaleb Hoblos and Nicolas Langlois

Friday, 19th November 2010

Plenary Session FrP4
Chair: Paolo Castaldi
Room 13

9:00-9:45 "A norm-based point of view for fault diagnosis: Application to aerospace missions"
Prof. David Henry, Bordeaux 1 University, Talence cedex, France

Design for Reliability and Safety FrA1
Chair: Alexandre Boriouchkine
Co-Chair: Piotr Skrzypczynski
Room 13

9:50 – 10:10 **6.** Diagnosis for the Reliability Improvement of Embedded Systems
Ouadie Bennouna, Houcine Chafouk and Jean-Philippe Roux

10:10 – 10:30 **14.** Reliability Assessment of Technical Devices Based on Degradation Data and Stochastic Equations
Ryszard Kopka

10:30 – 10:50 **38.** Task-Oriented Modelling of Rugged Terrain from Sparse Range Data
Dominik Belter, Przemyslaw Labecki and Piotr Skrzypczynski

10:50 – 11:10 **55.** Temporal Reliability Analysis of Embedded Systems
Afifa Ghenai and Mohamed Benmohammed

11:10 – 11:30 **64.** Fuel moisture content analysis as a basis for process monitoring of a BioGrate boiler
Alexandre Boriouchkine, Alexey Zakharov and Sirkka-Liisa Jämsä-Jounela

Informatics for Control FrA2
Chair: Leszek Koszalka
Co-Chair: Iwona Pozniak-Koszalka
Room 16

9:50 – 10:10 **21.** Evaluation Scheme of Task Allocation in Mesh Connected Processors with Metaheuristic Algorithms
Wojciech Kmiecik, Leszek Koszalka, Iwona Pozniak-Koszalka, Andrzej Kasprzak

10:10 – 10:30 **22.** Bus Route Optimization: an Experimentation System and Evaluation of Algorithms
Krzysztof Golonka, Leszek Koszalka and Andrzej Kasprzak

10:30 – 10:50 **23.** Routing in Mobile Ad-hoc Networks: an Experimentation System and Evaluation of Algorithms
Maciej Foszczynski, Marek Adamczyk, Kamil Musial, Leszek Koszalka, Iwona Pozniak-Koszalka, and Andrzej Kasprzak

10:50 – 11:10 **24.** Testing SQL queries: an experimentation system and efficiency evaluation
Michal Hans, Pawel Kmiecik, Iwona Pozniak-Koszalka, and Andrzej Kasprzak

11:10 – 11:30 **58.** Central sensor cluster simulation for anti-lock-braking system validation using hardware-in-the loop
Pawel Kret, Keith, J. Burnham, Leszek Koszalka and Alexandros Mouzakitis

Fault Detection and Isolation FrA3
Chair: David Henry
Co-Chair: Gianfranco Gagliardi
Room 19

9:50 – 10:10 **40.** A Fault Detection Filter Design Method for Hybrid Switched Linear Parameter Varying Systems
Gianfranco Gagliardi, Alessandro Casavola, Domenico Famularo and Giuseppe Franzè

10:10 – 10:30 **45.** Second-order sliding modes and soft computing techniques for fault detection
Milan Rapaic, Zoran Jelicic, Alessandro Pisano, and Elio Usai

10:30 – 10:50 **50.** Multi-Scale PCA based fault diagnosis for rotating electrical machines
Francesco Ferracuti, Andrea Giantomassi, Gianluca Ippoliti, and Sauro Longhi

10:50 – 11:10 **52.** Fault detection in flat systems by constraint satisfaction and input monitoring
Ramatou Seydou, Tarek Raissi, Ali Zolghadri and David Henry

11:10 – 11:30 **62.** Fault Detection and Isolation of Tennessee Eastman Process Using Improved RBF Network by Genetic Algorithm
Somayeh Hekmati Vahed, Mohammad Mokhtare, Hassan Abbasi Nozari, Mahdi Aliyari Shoorehdeli and Silvio Simani

Advanced Applied Fault Diagnosis FrB1
Chair: Vicenc Puig
Co-Chair: Andrea Monteriù
Room 13

12:00 – 12:20 **15.** Intelligent techniques for faults diagnosis and prognosis of CHP plant with gas turbine engine
Luigi Miozza, Andrea Monteriù, Alessandro Freddi and Sauro Longhi

12:20 – 12:40 **29.** Connections of Functional States for Automaton Identification: Application in a Steam Generator Monitoring
Javier F. Botia, Henry O. Sarmiento and Claudia Isaza

12:40 – 13:00 **61.** Robust Fault Detection of Nonlinear Systems using Local Linear Neuro-Fuzzy
Hasan Abbasi Nozari, Mahdi Aliyari Shooredeli and Silvio Simani

13:00 – 13:20 **43.** Fault Detection and Isolation of Wind Turbines: Application to a Real Case Study
Pep Lluis Negre, Vicenç Puig and Isaac Pineda

13:20 – 13:40 **56.** Data–Driven and Model–Based Fault Diagnosis of Wind Turbine Sensors
Silvio Simani, Paolo Castaldi and Marcello Bonfè

Signal Processing Techniques FrB2
Chair: Alessandro Pisano
Co-Chair: Przemyslaw Orlowski
Room 16

12:00 – 12:20 **16.** Periodic Linear Time-Varying System Norm Estimation Using Running Finite Time Horizon Transfer Operators
Przemyslaw Orlowski

12:20 – 12:40 **33.** Design of Unknown Input Reconstruction Algorithm in Presence of Measurement Noise
Malgorzata Sumislawska, Tomasz M. Larkowski and Keith J. Burnham

12:40 – 13:00 **46.** Unknown-input observation techniques in Open Channel Hydraulic Systems

Siro Pillosu, Alessandro Pisano, and Elio Usai

13:00 – 13:20 **48.** Unknown Input Observer with sliding mode disturbance estimator for the Diffusion PDE
Alessandro Pisano, Stefano Scodina, and Elio Usai

13:20 – 13:40 **59.** Extended Kalman Filter Approach for Road Condition Estimation: a preliminary study
Mariusz Ruta and Keith Burnham

Adaptive and Predictive Control FrB3
Chair: Andreas Paczynski
Co-Chair: Khaled Zabet
Room 19

12:00 – 12:20 **13.** Concept of an advanced monitoring, planning, control and diagnosis system for autonomous vehicles
Lothar Seybold, Andrzej Pieczyński, Andreas Paczynski and Ralf Stetter

12:20 – 12:40 **25.** Properties of NCGPC applied to nonlinear SISO systems with a relative degree one or two
Marcelin Dabo, Nicolas Langlois and Houcine Chafouk

12:40 – 13:00 **26.** Improvement of the Decoupling Feature of Decentralized Predictive Functional Control
Khaled Zabet and Haber Robert

13:00 – 13:20 **31.** Decoupling model predictive control in a non-minimal state space representation
Ulrich Hitzemann and Keith J. Burnham

13:20 – 13:40 **42.** A Constrained Strategy to Control Plasma Shape in ITER
C. V. Labate, M. Mattei, D. Famularo, F. Koechl, and V. Parail

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