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Editorial

Robustness Issues in Fault Diagnosis and Fault Tolerant Control

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Fault diagnosis and fault tolerant control have become critically important in modern complex systems such as aircrafts and petrochemical plants. Since no system in the real world can work perfectly at all time under all conditions, it is crucial to be able to detect and identify the possible faults in the system as early as possible so that measures can be taken to prevent significant performance degradation or damages to the system. Fault diagnosis is not relevant only for safety critical systems, but also for a significant number of systems, where availability is a major issue.

In the past twenty some years, fault diagnosis of dynamic systems has received much attention and significant progress has been made in searching for model-based diagnosis techniques. Many techniques have been developed for fault detection and fault tolerant control. However, the issue of robustness of fault detection and fault tolerant control has not been sufficiently addressed. Since disturbances, noise, and model uncertainties are unavoidable for any practical system, it is essential in the design of any fault diagnosis/fault tolerant control system to take these effects into consideration, so that fault diagnosis/tolerant control can be done reliably and robustly. The objective of this special issue is to report some most recent developments and contributions in this direction.

The special issue is initiated by a paper by P. Zhang and S. Ding, which gives a review of standard fault detection formulations, focusing on robustness issues for model-based diagnosis systems.

N. Liu and K. Zhou then study a number of robust fault detection problems, such as $\mathcal{H}/\mathcal{H}$, $\mathcal{H}_2/\mathcal{H}$, and $\mathcal{H}/\mathcal{H}$ problems, and it is shown that these problems share the same optimal filters. The optimal filters are designed by solving an algebraic Riccati equation.

The robust fault detection and isolation problem is studied in the paper by E. Mazars et al., where an $\mathcal{H}$ criterion is used, giving rise to a quadratic matrix inequality problem. A jet engine example is provided.

D. Campos-Delgado et al. suggest an active fault-tolerant control, and a design strategy is provided, which takes model uncertainty into account. The methods are illustrated for a DC motor example.

Systems that can be described by linear parameter varying models are considered by S. Grenaille et al. where robustness constraints are included in the design of fault detection and isolation filters. An illustration of the methods is given in terms of an application to a nuclear power plant.

A method for design of a diagnosis and a fault tolerant control system using an integrated approach is presented in the paper by S. Yang and J. Chen. The design is illustrated for a double inverted pendulum system.

M. Benini et al. present both a linear and a nonlinear fault detection and isolation scheme. This paper focuses on robust fault diagnosis for an aircraft model, and has extensive simulations.

The fault tolerant scheme proposed by R. Dionisio and J. Lemos is capable of stabilizing systems with intermittent sensor faults. The approach is based on reconstructing the feedback signal, using a switching strategy where a model is used in the intermittent periods.

A design method for actuator fault diagnosis is proposed in the paper by Q. Zhang, where the focus is to obtain robustness with respect to nonlinear sensor distortion. A numerical example is given.

The problem of designing fault tolerant control systems for networked systems with actuator faults is treated in the

paper by Li et al. The proposed design method is demonstrated by a numerical example.

The notion of a reliability index is introduced by H. Li et al., for monitoring fault tolerant control systems. The reliability is evaluated based on semi-Markov models, and the approach is applied to an aircraft model.

The final paper of the special issue by N. Wu et al. addresses fault tolerant control of a distributed database system. The fault tolerant design relies on data redundancy in the partitioned system architecture. Robustness is represented by the introduction of additional states modeling delays and decision errors. The design is based on solving Markovian decision problems.

Jakob Stoustrup
Kemin Zhou

Special Issue on
Fuzzy Logic Techniques for Clean Environment

Call for Papers

The fuzzy technique for clean energy, solar and wind energy, is the most readily available source of energy, and one of the important sources of the renewable energy, because it is nonpolluting and, therefore, helps in lessening the greenhouse effect. The benefits arising from the utilization of solar and wind energy systems can be categorized into two sections: energy saving and the decrease of environmental pollution. The clean energy saving benefits come from the reduction in electricity consumption and from using any conventional energy supplier, which can avoid the expenditure of fuel supply. The other main benefit of the renewable energy is the decrease of environmental pollution, which can be achieved by the reduction of emissions due to the usage of electricity and conventional power stations. Electricity production using solar and wind energy is of the main research areas at present in the field of renewable energies, the significant price fluctuations are seen for the fossil fuel in one hand, and the trend toward privatization that dominates the power markets these days in the other hand, will drive the demand for solar technologies in the near term. The process of solar distillation is used worldwide for arid communities that do not have access to potable water. Also some solar technologies provide other benefits beside power generation, that is, fresh water (using desalination techniques).

The main focus of this special issue will be on the applications of fuzzy techniques for clean energy. We are particularly interested in manuscripts that report the fuzzy techniques applications of clean energy (solar, wind, desalination, etc.). Potential topics include, but are not limited to:

- Solar power station
- Wind power
- Photovoltaic and renewable energy engineering
- Renewable energy commercialization
- Solar cities
- Solar powered desalination unit
- Solar power
- Solar power plants
- Solar systems (company)
- World solar challenge
- Seawater desalination to produce fresh water
- Desalination for long-term water security

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Manuscript Due	October 1, 2009
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International Journal of Navigation and Observation

Special Issue on

Selected Papers from Workshop on Synergies in Communications and Localization (SyCoLo 2009)

Call for Papers

In conjunction with the IEEE International Conference on Communications (ICC) 2009 in Dresden, Germany, the International Workshop on Synergies in Communications and Localization (SyCoLo 2009) will be held.

The main objective of this workshop is to show how wireless communications and navigation/localization techniques can benefit from each other. With respect to these synergies the workshop aims at the following fundamental questions:

- How can navigation systems benefit from existing communications systems?
- How can communication systems benefit from positioning information of mobile terminals?

This workshop, whose proposal was jointly generated by the EU Research Projects WHERE and NEWCOM++, aims at inspiring the development of new position-aware procedures to enhance the efficiency of communication networks, and of new positioning algorithms based both on (outdoor or indoor) wireless communications and on satellite navigation systems.

The SyCoLo 2009 is, therefore, well in agreement with the new IJNO journal aims at promoting and diffusing the aims of joint communications and navigation among universities, research institutions, and industries.

This proposed IJNO Special Issue focuses all the research themes related to the timing aspects of joint communications and navigation, and starts from the SyCoLo 2009 where the Guest Editors will attend the different sessions and directly invite the authors of the most promising papers to submit an extended version of their papers to the journal.

The proposed Guest Editors are also part of the Scientific Committees of the SyCoLo 2009, therefore, directly involved in the evaluation of submitted papers.

Topics of interest will include, but are not limited to:

- Hybrid positioning using both wireless communications and satellite navigation systems
- Resource management with positioning information
- Location-aware PHY/MAC algorithms/procedures
- Indoor positioning combined with short-range communications
- Signal processing techniques for (seamless) indoor/outdoor localization

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Advances in Artificial Intelligence

Special Issue on
Artificial Intelligence in Neuroscience and Systems Biology: Lessons Learnt, Open Problems, and the Road Ahead

Call for Papers

Since its conception in the mid 1950s, artificial intelligence with its great ambition to understand intelligence, its origin and creation, in natural and artificial environments alike, has been a truly multidisciplinary field that reaches out and is inspired by a great diversity of other fields in perpetual motion. Rapid advances in research and technology in various fields have created environments into which artificial intelligence could embed itself naturally and comfortably. Neuroscience with its desire to understand nervous systems of biological organisms and system biology with its longing to comprehend, holistically, the multitude of complex interactions in biological systems are two such fields. They target ideals artificial intelligence has dreamt about for a long time including the computer simulation of an entire biological brain or the creation of new life forms from manipulations on cellular and genetic information in the laboratory.

The scope for artificial intelligence, neuroscience, and systems biology is extremely wide. The motivation of this special issue is to create a bird-eye view on areas and challenges where these fields overlap in their defining ambitions and where these fields may benefit from a synergetic mutual exchange of ideas. The rationale behind this special issue is that a multidisciplinary approach in modern artificial intelligence, neuroscience, and systems biology is essential and that progress in these fields requires a multitude of views and contributions from a wide spectrum of contributors. This special issue, therefore, aims to create a centre of gravity pulling together researchers and industry practitioners from a variety of areas and backgrounds to share results of current research and development and to discuss existing and emerging theoretical and applied problems in artificial intelligence, neuroscience, and systems biology transporting them beyond the event horizon of their individual domains.

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Manuscript Due	September 1, 2009
First Round of Reviews	November 1, 2009
Publication Date	December 1, 2009

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