## Editorial

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**Biographical notes:** Wen Yu obtained his BS in Electrical Engineering from Tsinghua University, China in 1990 and his MS and PhD in Electrical Engineering from Northeastern University, China, in 1992 and 1995, respectively. From 1995 to 1996, he served as a Lecturer at the Department of Automatic Control, Northeastern University. In 1996, he joined CINVESTAV-IPN, México, where he is currently a Professor at the Departamento de Control Automático. He also held a research position with the Instituto Mexicano del Petróleo, from December 2002 to November 2003. Since October 2006, he has been a Senior Visiting Research Fellow at Queen's University Belfast. He also held a visiting professorship at Northeastern University, China. He serves as an Associate Editor of *Neurocomputing* and the *International Journal of Modelling, Identification and Control*. He is a member of the Mexican Academy of Science.

Jin-Hua She obtained his BS in Engineering from Central South University, Changsha, China, in 1983 and his MS degree in 1990 and his PhD in 1993 in Engineering from the Tokyo Institute of Technology, Tokyo, Japan. In 1993, he joined the Department of Mechatronics, School of Engineering, Tokyo University of Technology and in April, 2008 he transferred to the university's School of Computer Science, where he is currently an Associate Professor. He received the IFAC Control Engineering Practice Paper Prize in 1999 (jointly with M. Wu and M. Nakano). His current research interests include the application of control theory, repetitive control, process control, internet-based engineering education and robotics.

Welcome to this special issue on fuzzy and neural control with engineering applications. Over the past several decades, fuzzy systems (FSs) and neural networks (NNs) have attracted the interest of many researchers and engineers because they bring a universal approximation capability to non-linear mapping, learning, and generalisation. This special issue of the *International Journal of Advanced Mechatronic Systems* presents eight original articles. Three of them are extended versions of papers presented at the *6th International Symposium on Neural Networks (ISNN2009)*, 26–29 May 2009, Wuhan, China and the others were selected from a large number of submissions to the special issue.

FSs and NNs are useful for the modelling and control of complex dynamic systems. They are powerful tools that contribute greatly to the development of intelligent control theory. Researchers have investigated many interesting theoretical questions in the field of control engineering, thus helping to make the field more theoretically rigorous. On the other hand, successful engineering applications of such advanced technologies give us more confidence in them and broaden our perspective on their use. We believe that this special issue provides valuable reference material for understanding fuzzy and neural control techniques and for learning about the latest development trends in these fields. Eight papers have been selected to reflect this thematic vision. They are briefly described below.

- 1 The paper entitled 'Fuzzy-neural control theory applied to task-oriented proactive seamless migration application' by Zhang and Wang describes how to use a fuzzy-neural control approach to solve a proactive seamless migration problem. It shows that this fuzzyneural control-based fusion method provides a webbased application with both the advantages of fuzzy logic and the adaptive optimum of a proactive or attentive service.
- 2 The paper entitled 'Adaptive NN control of a class second-order non-linear systems with unknown dead zones' by Yu, Li, and Du discusses a non-smooth

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control method that employs radial basis function (RBF) NNs to stabilise unknown non-linear systems with an unknown dead zone. Simulation results demonstrate the validity of the method.

- 3 The paper 'Optimal operation control of the raw slurry blending process using the case-based reasoning and neural network' by Rui, Zhang, Tong and Chai considers the use of case-based reasoning and NNs for the optimal control of a raw slurry blending process. The results of actual runs prove the effectiveness of the method.
- 4 The paper entitled 'Recurrent neural network model for reheating furnace based on sequential learning with unscented Kalman filter' by Liao, She and Wu describes a recurrent NN model of a walking beam reheating furnace based on a sequential learning algorithm. Growing and pruning criteria based on the significance of hidden neurons and an unscented Kalman filter are used to keep the network compact and to improve the learning accuracy.
- 5 The paper entitled 'Magnetostrictive micropositioning device with fuzzy-neural-based controller' by Rubio and Duduch discusses the use of fuzzy logic and an artificial, NN-based motion control algorithm in a micropositioning system. Since the algorithm utilises incomplete information on the model of the plant, it results in a more robust and flexible control system than conventional approaches.
- 6 The paper entitled 'Non-linear model predictive control based on neural network model with modified differential evolution adapting weights' by An, Hao, Wang and Su describes a modified differential evolution optimisation approach to retraining NNs online and how to use these adaptive NNs to design a non-linear predictive control strategy. Simulation results for a methanol water distillation column show the effectiveness of the method.
- 7 The paper entitled 'Perception neural network versus fuzzy neural network for controlling the inverted pendulum' by Belal compares the control performance of a perception NN with that of a fuzzy NN in the control of an inverted pendulum. Experimental results show that a perception NN provides superior control accuracy.
- 8 The paper entitled 'Design of optimal MLP and RBF neural network classifier for fault diagnosis of three phase induction motor' by Ghate and Dudul explains an NN-based incipient fault detection method for the fault diagnosis of a three-phase induction motor. Verification of the optimal performance in fault identification using experimental data demonstrates the validity of the method.

#### Acknowledgements

The guest editors wish to thank the editor-in-chief, Mingcong Deng, for providing the opportunity to edit this special issue. We also wish to thank the referees who carefully evaluated the papers in a short time. Finally, we hope the reader will share our enthusiasm for this special issue and find it useful.