
Editorial

Jinglong Wu

Graduate School of Natural Science and Technology,
Okayama University,
1-1-1 Tsushima-naka, Kita-ku,
Okayama, 700-8530, Japan
E-mail: wu@mech.okayama-u.ac.jp

Biographical notes: Jinglong Wu received his MS and PhD from Kyoto University, Japan in 1991 and 1994, respectively. Beginning in 1994, he served as an Assistant Professor in Ritsumeikan University, Japan. He held the position of a Lecturer in Yamaguchi University, Japan in 1997. From 1999, he was an Associate Professor and was promoted to a permanent Full Professor of Kagawa University, Japan in 2002. Since 2008, he has been Professor and Lab. Head of Biomedical Engineering Laboratory of Okayama University, Japan. He has mainly been involved with the studies of human mechanism of visual, auditory and tactile information processing. He also served as an Editor-in-Chief of *Neuroscience and Biomedical Engineering*, an Associate Editor of the *International Journal of Information*, editorial board member of *Web Intelligence and Agent Systems*, and editorial board member of *ISTSS Research*.

This is the special issue composed of selected papers from the 2012 International Conference on Advanced Mechatronic Systems (ICAMechS 2012). This conference was held at Tokyo, Japan, September 18–21, 2012. In this special issue, six technical contributions on advanced control method and application are selected for publication. The contents of these studies are briefly described below.

The paper entitled ‘PID controller design for micro gas turbines using experimental frequency-response data and a linear identification technique’, by Banazadeh, Gol and Ramazani, discusses the identification process of engine dynamics and presents derived transfer function models including; thrust, shaft speed, compressor exit pressure and turbine exit temperature in relation to the fuel flow. Model identification approach, presented in this paper, is the first to consider frequency-sweep signals to excite dynamics, as well as to utilise windowing and smoothing techniques to reduce random errors in the spectral estimates. The identified models are also validated with the engine responses to doublet input as well as the engine comprehensive thermodynamic model. In addition, a PID controller is designed based on the identified models to effectively control the non-linear system.

In ‘Indeterminate masses, elements and models in information fusion’, Smarandache makes a short history of the logics, from the classical Boolean logic to the most general logic of today neutrosophic logic. The author defines the general logic space and gives the definition of the neutrosophic logic. Then he introduces the indeterminate models in information fusion, which are due either to the existence of some indeterminate elements in the fusion space or to some indeterminate masses. The best approach for dealing with such models is the neutrosophic logic, which part of neutrosophy. Neutrosophic logic is connected with neutrosophic set and neutrosophic probability and statistics.

The paper ‘Initial position estimation of a mobile robot with a laser range finder by differential evolution’, by Tanaka and Kochi, treats the portion of localisation problems at the beginning of the movement. In this paper, authors consider the case when the local sensor attached to the mobile robot is only a laser range finder. The unknown variables to be estimated are the 2-D position and the orientation. This problem can be solved by general algorithms for non-linear optimisation, and among them, authors apply differential evolution. As the fitness function, authors use the mixture probability density function that can meet various conditions of scanning targets. The usefulness of the proposed method is demonstrated through experiments.

The goal of ‘A robot prosthetic finger system based on finger joint angle estimation using EMG signals’, by Araki, Nakatani, Inaya, Konishi and Mabuchi was to develop a robot prosthetic hand system for an amputee that estimates his desired finger angle from neural signals, and operates with the motion he intends. The authors have previously proposed a finger joint angle estimation method based on surface electromyography (EMG) signals and a linear model. This method was based on a histogram of EMG signals, and may be applicable to surface EMG signals as well as neural signals. Moreover, an artificial finger robot has been designed and developed for finger amputation patients. Using this robot and applying our proposed finger joint angle estimation method, they carried out experiments in which the robot is synchronised with the subject’s third finger motion.

The paper entitled ‘Iterative method for the mixed H_2/H_∞ control with a usable feasible direction of the H_2 optimisation’, by Kami and Nobuyama, deals with the mixed H_2/H_∞ control problem with static state feedback. The purpose of this paper is to propose an iterative method for this problem using a usable feasible direction for H_2 cost

function. To do that, we derive one usable feasible direction for the H_2 norm constraint firstly. Secondly an iterative method for the unconstrained H_2 control problem using the direction is proposed. Next, we extend this method to that for obtaining a mixed H_2/H_∞ controller. Finally, the efficiency of the proposed method is shown by a numerical example.

Using semi-tensor product and the vector form of multi-valued logical variables, the mix-valued logical system is expressed as a linear discrete time system and the mix-valued logical control system is expressed as a bilinear discrete time system with respect to the state and control variables. In 'Analysis of mix-valued logical control networks' by Li, Xiao and Song, the topological property of

mix-valued logical network and the reachability and controllability of mix-valued logical control systems are discussed. From the algebraic form of mix-valued logical network, the authors obtain the number of the logical system. The formula we obtained is based on the rank of structure matrix. Also, the necessary and sufficient conditions are obtained for testing the reachability and controllability.

As guest editors of this special issue, we would like to thank all the authors for their contributions. We believe that the readers can benefit from the papers in this special issue. Finally, we would also like to appreciate the reviewers' excellent jobs on evaluating these papers.