Editorial

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Biographical notes: Xinkai Chen received his PhD in Engineering from Nagoya University, Japan in 1999. He is currently a Professor in the Department of Electronic Information Systems, Shibaura Institute of Technology, Japan. His research interests include adaptive control, hysteresis control, motion control and machine vision. He has been serving on the editorial boards of several journals, including *IEEE Transactions on Automatic Control*. He has also served as organising committee members for many conferences.

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

The paper entitled 'Modelling of a smart micro grid with renewable energy for rural area based on power line communication', by Sarker and Nagasaka, proposes power line communication-based (PLC) platform on dynamic demand response and distributed generation including renewable power generation management approach in the context of smart micro grid model for residential and industrial consumptions. In the proposed model, deployed PLC networks, data management system to integrate sensors, switchgears, transformers and other utility devices are used to interconnect smart homes to smart grids. Analytical results show the effectiveness of the proposed system to optimise residential renewable energy generation and smart meters to improve electrical grid control and energy conservation system.

The paper 'ANN-based reactive power controller with real-time web monitoring', by Salaan, Victoria and Estoperez, introduces a real-time reactive power controller based on artificial neural network with web-based monitoring. A feed-forward employing back-propagation is used as training technique. The inputs to the network are the active and reactive power of each load. The targets are to switch on/off the capacitor banks during normal and abnormal conditions. The network is trained by using developed MATLAB program and the weights resulted to minimum mean-square-error are fed to the microcontroller unit. The method is then tested in a 3-bus radial distribution system model and implemented by using Zilog microcontroller. The system actions are monitored by using web-based monitoring application.

The paper 'Supply-side management of CO_2 emissions in a competitive market', by Takamori, Go and Nagasaka, aims to design a program for managing CO_2 emissions in the electricity supply industry. The subject matter is a collection of firms, each of which behaves purposefully and competitively in seeking its own objectives. Emissions, a by-product, are outside of firms' business concerns, and represent externalities. An effective instrument for controlling the externalities is a pricing mechanism that induces firms to act in line with the global objective. This instrument works when the competitors are driven by profit seeking incentive. The paper presents a model and algorithm for the regulator to price emissions and grandfather allowances.

The purpose of the paper 'Development and control of flexible spherical actuator using flexible pneumatic cylinders', by Dohta, Akagi, Liu and Ando, is to develop a flexible and lightweight actuator which can be safe enough to be attached to the human body, and to apply it to a flexible mechanism and rehabilitation device. In this paper, a flexible spherical actuator using the novel flexible pneumatic cylinders is proposed and tested. The quasi-servo valve developed in our previous study is used in the control system and a micro-computer is also developed. In addition, the spherical actuator is improved so as to suppress the vibration in control and to increase the stiffness of the actuator by changing the structure of the actuator. As a result, a large working area of the actuator can be obtained using the tested simple-structured spherical actuator.

In the paper 'A study on dynamic characteristics and the power generation characteristics of the magnetically levitated hydraulic generator', by Kurita, Ishikawa, Daikai and Ohshio, a novel permanent magnet biased magnetic bearing which has a three-dimensional flux path is designed and fabricated in order to develop high-efficiency and small-sized hydrodynamic generators. The magnetic bearing is small but has a strong bearing capacity. This paper clarifies the operation principle and dynamic characteristics of the fabricated magnetic bearing. The fabricated magnetic bearing shows good control performance in both the time and frequency domains. In addition, the rotor rotates stably up to 10,000 min-1, and the rotational loss of magnetic

bearing is about one-fifth compared with a conventional mechanical ball bearing.

The paper 'Development of a flexible customised compression garment pattern design system', by Salleh, Lazim, Othman and Merican, highlights a new method that can be used to construct a customised compression garment for athletes. The garment is generated using 3D data of an athlete's body segment obtained by a non-invasive non-contact measurement system. Then, a 3D compression garment is generated by using a novel modelling approach taking into account the properties of the fabric, the pressure to be exerted and the curvature of body parts. The 3D garment model is then flattened into a 2D compression garment pattern design. Finally an experiment is conducted to validate the system. The outcome of the research is a system that not only allows for the design of a customised compression garment, but also can be used to create a variety of compression garment that can exert different pressure.

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