
Editorial

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This is the special issue composed of selected papers from the 2011 International Conference on Advanced Mechatronic Systems (ICAMEchS '11). The conference was held at the Zhongyuan University of Technology, China, August 11–13, 2011. Six technical contributions on practical applications presented during the conference were selected for publication into this special issue. The contents of these studies are briefly described below.

In the paper entitled 'Stage positioning based on improved feedback error learning and its experimental verification' by Nakamura, Morimoto and Wakui, the problem of positioning control of a linear stage is considered. To improve the settling time, the parameters of the feedforward controller are automatically tuned by using feedback error learning (FEL). In the proposed FEL, the number of the estimated parameters is reduced and it is guaranteed that the true parameters values are small. This leads to decreasing of the learning time. Moreover, to compensate the negative effects of the non-parallel guide rails, a disturbance observer is utilised. By using the observer, the performance of the positioning can be maintained regardless of the initial position of the stage. Experimental results show the effectiveness of the proposed control method.

Achieving optimal operation of thermal power units, improving the efficiency and reducing the coal consumption is of great significance for the reduction of the greenhouse gas (GHG) and pollutants emissions. The up-to-date research results in modelling and simulation of thermal power units are reviewed in the paper by Liu, Wang, Ding and Zhen entitled 'An overview of modelling and simulation of thermal power plant'. Firstly, several common models of thermal power control systems are analysed, including simplified turbine and furnace models for a unit coordinated control system (CCS) as well as local equipment models. Next, the system structure, functions, and applications of thermal power stimulated simulators are described. Finally, the structure and the functions of digital power plant together with the respective simulation technology are introduced. Challenges in the modelling and simulation of thermal power plants are discussed at the end of the paper.

The paper 'Off-shore wind power potential evaluation and economy analysis of entire Japan using GIS technology' by Abudureyimu, Hayashi, Litifu and Nagasaka, is focusing on the analysis of off-shore wind power energy generation potential of Japan using geographic information system (GIS) technology. Based on the economy and environment assessment, this research is evaluating the current situation and forecasting the future of the wind power energy technology in Japan. In order to reduce the green-house gas emissions, renewable energy (such as wind power, solar energy, fuel cells, etc.) will gradually substitute the primary energy resources (coal, petroleum and natural gas). Using the GIS technique, the authors present simulation results about the potential of wind power generation (2,000 kW/unit) along the entire Japanese coast area. It is shown that annual wind power

generation of 180.0 TWh can be expected. This is equal to 20% of the annual total generated power in Japan in 2010. The wind power generation and the equipment installation costs analysis are also presented.

A modular reinforcement learning system (modular RL) with adaptive networks was proposed for applying the reinforcement learning into control tasks with numerous inputs in the paper 'Modular reinforcement learning with adaptive networks' by Asano and Yamada. The system is composed of several control modules and a selection module. The calculations for all its modules are performed by using the incremental normalised Gaussian networks (INGnet). The modular RL (INGnet) showed a better learning ability in all three control tasks performed in this study than the modular reinforcement learning whose all modules are calculated by CMAC [modular RL (CMAC)]. It showed a better or similar learning ability to the reinforcement learning using INGnet [RL (INGnet)]. From the simulation results obtained in this study, the modular RL (INGnet) is considered to have a better learning ability in the control tasks with a large number of inputs (8–10) than the modular RL (CMAC) and the RL (INGnet).

In the paper 'Detection of irregular ground area by single camera on mobile vehicles', Tanaka and Onishi propose a new method for making distinction between points on the ground surface (on-ground points) and points situated above the ground surface (off-ground points). These points are detected as feature points by speeded up robust feature (SURF) algorithm. In the model building phase, the projection transformation model of the ground, seen from the camera angle is built. In the implementation phase, the camera detects feature points by using SURF algorithm, and then makes correspondence of the feature points between the consecutive frames. By inverse projection, the points can be classified into on-ground and off-ground points. The implementation phase is executed online. The authors propose the principle of this theory and show an example validating the theory.

The paper by Kroumov and Okuyama entitled 'Localisation and position correction for mobile robot using artificial visual landmarks' presents some preliminary results in terms of improving the precision in localisation and position correction of a mobile robot. The visual simultaneous localisation and mapping (vSLAM[®]) algorithm is used for robot navigation. Artificial landmarks are used to improve the positioning of the robot. Experimental results show that, compared to other techniques, the proposed method has several advantages and can improve the robot localisation and position calibration when vSLAM algorithm is used.

As guest editors of this special issue, we would like to thank the authors for their contribution. We believe that the readers will benefit greatly from the special issue. We would also like to thank the *International Journal of Advanced Mechatronic Systems* for giving us the opportunity to serve as guest editors. Finally, we would also like to thank the reviewers for their excellent job on evaluating these papers.