
Editorial

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Biographical notes: Yegui Xiao is currently a Professor at Prefectural University of Hiroshima, Hiroshima, Japan. He received his BS from the Department of Automatic Control, Northeastern University, Shenyang, China in 1984. He received his MS and PhD from Hiroshima University, Higashi-Hiroshima, Japan in 1988 and 1991, respectively. His research interests include statistical and adaptive signal processing, active noise control, biomedical signal processing, time-series prediction, neural networks, and face and facial expression recognition.

This special issue published six selected papers whose original versions were presented at the 2012 International Conference on Advanced Mechatronic Systems (ICAMechS 2012, September 18–21, 2012) held in Tokyo, Japan. These papers are extended and modified versions of their original forms. More than two reviewers were allocated for each paper. I hope these papers provide a window through which we can get a glimpse of practical mechatronic systems and technologies.

The first paper presents a new mowing robot which is capable of mowing quite close to obstacles while maintaining safety. This robot is operated by a wireless controller, and consists of three mechanisms that execute mowing, driving, and lifting operations. Several experiments were conducted to confirm its capabilities and limitations that might be improved in the future.

A new pipe inspection robot is presented in the second paper, which is able to slide in a wet and narrow pipe and perform inspection task smoothly. The authors improved the previous sliding mechanism such that the robot can travel in a narrow pipe with a diameter as small as 50 mm and make turn easily at both elbow and tee. This robot enjoys great flexibility as well as bending mobility, and thus superior operability as compared to its predecessors.

In the third paper, a bipedal robot with 3D quasi-passive walking specification is depicted. The robot has flat feet driven by antagonistic pneumatic artificial muscles. The authors examined the ankle structure and control method of the existing walker to improve its performance. Extensive experiments were conducted, which reveal that quasi-passive walking can be stabilised when motions on lateral and sagittal planes are synchronised.

A power generation device is presented in the fourth paper. This device is capable of generating electric power from vibrations of vehicles. Two so-called principle models with elastic body were adopted to develop a multi-axial vibration power generator. Frequency properties and output characteristics of the models placed in different ways are evaluated based on vibration tests. This technology may contribute to the realisation of low carbon society in the future.

The fifth paper has more theoretical flavour in comparison with other papers, as an iterative learning observer (ILO) proposed before was applied to develop new velocity estimators in the state space. A real product called Crossbow NAV440 was used to confirm the effectiveness of the proposed estimators. It has been revealed that the proposed estimators are more robust against additive noise as compared to existing differentiator-based ones.

The last paper deals with modification of fruit sorting machine by applying a signal processing technique. Peak signal to noise ratio (PSNR) is adopted to analyse the performance of classification. Measures are taken to improve the PSNR such that the sorting machine can work in a robust way. Experiments with apples were conducted to adjust and improve the performance of the sorting machine.

Finally, as a guest editor for this special issue, I would like to express my cordial thanks to the authors who have selected this journal as a forum for publishing their research achievements. The reviewers were very generous to me. Their kind help is greatly appreciated.