Editorial

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Robotics has become increasingly and rapidly popular worldwide and, thus is expanding its reach in many non-traditional areas of science and technology. Biorobotics is a result from the marriage of biology and robotics and is a research field that is attracting massive interest worldwide. While biorobotics is about principles and theory of different forms of biorobots, biomechatronics should be the synergic combination of precision mechanical engineering, computer technologies, electronic control and systems thinking in the design of biorobots and biologically inspired systems.

Researchers in New Zealand and Australia are active and keen to explore biorobotics and biomechatronics applications. This special issue presents their recent research results that emphasise new trends and innovations in bioengineering, biomedicine, agriculture, and horticulture. A total of twelve original papers are collected.

The first six papers are sort of 'robotic'. Pap, Xu and Bronlund have introduced a human masticating robot, where the biomechanical foundation of the muscles of mastication on which the platform robot has been built is presented together with substantial kinematics simulations. Based on honeybee homing principles, Peng, Xie and Cheng propose a new computational model called HVSM (Horizontal and Vertical Snapshot Model) for the navigation of visual robots. The model utilises information of both dimensions of an image seen by a homing agent. Wei, Austin and Mahony address the problem of docking a uni-cycle-like robot by proposing a Weighted Landmark Vector model. The method permits changes to the contributing weights of landmarks so that more control can be exerted over the trajectory. Hurd et al. present a robotic system for automatic meat processing which incorporates a neural network-based fault detection technique and online learning algorithm to provide continuous carcass cutting path optimisation. Ha, Tran and Dissanayake have developed a voice interface for wheelchair control that involves using wavelet transform to detect human voice pitch and the location of speech end points, and neural network for recognition of monosyllable-word voice commands. The sixth paper of this group by Tlale, Bright and Xu describes a hexapod climbing robot that implements CAN (i.e., Controller Area Network) for distributed control of various actuators and sensors.

The second group of four papers is specific to the applications of modelling, control and robotics in medicine and bioengineering. Aiming at a consistent and robust controller for safe, predictable regulation of blood glucose levels in critical care patients, Chase et al. present interesting clinical results of their studies in the impact of insulin-stimulated glucose removal saturation on dynamic control effectiveness. Moorhead et al. propose a decentralised auto-regulatory control for cerebral blood supply which is expressed in one- and three-dimensional computational fluid dynamics models. Chase et al. take a physiologically verified nonlinear model of agitation–sedation dynamics to develop an automatic agitation control system, and they also present a H-infinite method to agitation feedback controllers.

The other three papers are about formate biosensing and its fabrication by Yuan, airborne pollen texture identification in horticulture applications by Zhang, Wang and Hunter and, an algorithm for log-polar sensor to detect, track and fixate corners and its applications to robotic visual feedback control by Yeung and Barnes.

Finally, we would like to thank all of the authors for their contributions and the anonymous reviewers for helping improve the papers. We would also like to thank the Editor-in-Chief Dr. M. Dorgham for his approval of this special issue.