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Editorial

Welcome to our 2nd Special Issue on *Biologically Inspired Robots and Mechanisms*. In this issue you will find some relevant articles on this exciting field.

First, in the article *Pleated Pneumatic Artificial Muscles as Biologically Inspired Actuator: Study of the Specific Dynamic Characteristics for its use in Automation Industry,* by Rino Versluys, Kristel Deckers, Patrick Guillaume, and Dirk Lefeber, the dynamic response of a PPAM-valve system is addressed from two perspectives: varying amplitude and varying offset of the applied sinusoidal input signal. Thus, the influence of both the amplitude and the offset of the applied signal on the system's bandwidth could be investigated. A short introduction to PAMs is given, some characteristics are discussed, and different test methods and experimental results are presented. Next, the paper, *On Control of Reaching Movements for Musculo-Skeletal Redundant Arm Model,* by Kenji Tahara, Suguru Arimoto, Masahiro Sekimoto, and Zhi- Wei Luo, focuses on a dynamic sensory-motor control mechanism of reaching movements or a musculoskeletal redundant arm model. The formulation of a musculo-skeletal redundant arm system, taking into account nonlinear muscle properties is introduced and several numerical simulations are performed. The results suggest that the reaching movements can be achieved using only a simple task-space feedback scheme in conjunction with the internal force effect resultant from nonlinear properties of skeletal muscles, without any complex mathematical computation. Afterwards, *Biological Inspiration in the Design of a New Biped Robo*t, by Giuseppina Gini, Umberto Scarfogliero, and Michele Folgheraiter, presents a human-oriented approach to design the architecture and to synthesise the gaits for a biped robot. Starting from the analysis of the human lower limbs, it is determined the features of the human legs that are fundamental for a correct walking motion, and that can be adopted in the mechanical design of a humanoid robot. The approach focuses on the knee, designed as a compliant human-like knee instead of a classical pin-joint; and on the foot, characterized by the mobility and lightness of the human foot. Next, *Animal-Inspired Sensing for Autonomously Climbing or Avoiding Obstacles*, by William A. Lewinger, Cynthia M. Harley, Michael S. Watson, Michael S. Branicky, Roy E. Ritzmann, and Roger D. Quinn, contrasts how the addition of two separate sensing modalities, tactile antennae and non-contact sensing, and a low-computation capable microcontroller allow a biologically-abstracted mobile robot to make insect-inspired decisions. In particular, when encountering a shelf-like obstacle, navigating a cluttered environment without collision, and seeking vision-based goals while avoiding obstacles. In a subsequent article, *Dynamic Locomotion of a Biomorphic Quadruped 'Tekken' Robot Using various Gaits: Walk, Trot, Free-Gait and Bound,* by Yasuhiro Fukuoka, and Hiroshi Kimura, a biological control method is adapted for the legged locomotion in order to develop a dog-like quadruped (Tekken) robot. Tekken has a control system that incorporates CPGs, reflexes, and responses, as well as a special mechanism that makes the most of the control system. Tekken is capable of achieving walking and trotting on flat terrain, can walk using a free-gait on irregular terrain, and it is also capable of running on flat terrain using a bounding gait. Next, *Self-Stabilising Quadrupedal Running by Mechanical Design,* by Panagiotis Chatzakos, and Evangelos Papadopoulos, demonstrate that a quadruped robot could be able to perform self-stable running behavior in significantly broader ranges of forward speed and pitch rate with suitable mechanical design, which is not limited to choosing leg spring stiffness only. The results of their study, based on the stability of the passive dynamics of a quadruped robot running in the sagittal plane in a dimensionless context, might explain the success of simple, open loop running controllers on existing experimental quadruped robots. Finally, the article *Towards a Methodical Approach to Implement Biomimetic Paradigms in the Design of Robotic Systems for Space Applications,* by Carlo Menon, N Lan, and D Sameoto, proposes a methodology to reduce the element of chance in the design of biomimetics systems, and to provide a basis for the further development of biomimetic design procedures. The application of the proposed systematic approach is illustrated through case studies of ongoing biomimetics research with relevance to space robotics in the form of climbing robots utilising synthetic dry adhesives.

We would like to mention that Applied Bionics and Biomechanics will be publishing in the near future another Special Issue on *Biologically Inspired Robots and Mechanisms*. That Special Issue will again contain significant contributions in the field. We would like also to bring to your attention that Applied Bionics and Biomechanics will be publishing in the near future other

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Special Issues on related topics such as: *Upper and Lower Limb Exoskeletons*, *Humanoid Robots*, and *Robot Assisted Surgery*.

Applied Bionics and Biomechanics warmly welcomes past, present, and new authors to the regular and Special Issues of this journal that it is truly international in scope with published manuscripts from all over the world. We hope that our regular issues, this Special Issue on Biologically Inspired Robots and Mechanisms, and the upcoming Special Issues, will continue to be of great interest, use, and benefit to you.

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