

EDITORIAL

Special Issue on Applications of Reconfigurable Mechanisms and Robotics

In the face of the global challenges of energy shortage and environmental crisis, the trend of design and development of machinery and robots that can save energy and alter their functions to adapt to the changing requirement and environment is now ever-growing. This special issue aims to collect and demonstrate the emerging application cases of reconfigurable mechanisms and robotics. It contains seven papers with contributions from the fifth IEEE/IFTOMM International Conference on Reconfigurable Mechanisms and Robotics (ReMAR 2021) and an Open Call for Papers.

Reconfigurable mechanisms and robotics are characterised by their features of changeable mobility, configurations, kinematic and dynamics properties, and functional performances. In this special issue, researchers have found applications in hardware form demonstrated in the design and development of smart mechanisms and robotics, and in software form reflected in the investigation and implementation of revamped computing algorithms. Zhang et al. proposed a novel terrestrial/aerial robot that has lower energy consumption on ground actions and higher manoeuvrability in aerial flight. Bian et al. presented a class of spatial remote centre-of-motion mechanisms for applications in robot-assisted minimally invasive surgery. Song et al. formulated an efficient method for configuration selection to achieve the optimised tip-over stability of a modular reconfigurable mobile manipulator with applications in various scenarios. Further, based on the two-fold symmetric Bricard linkage, Chen et al. designed a cable-driven one-DOF-compliant gripper. By extending the cable-driven approach, Peng et al. derived a dynamic model to characterise the cable vibration behaviours of a cable-driven parallel robot with flexible cables. With applications in agricultural practices and farming, Chitre et al. proposed an optimal configuration synthesis approach for generating reconfigurable robot manipulators based on modular architectures. Interestingly, through software path, by combining the ant colony algorithm with the particle swarm algorithm, Tan et al. proposed an improved path planning algorithm for spot welding robots that provide higher resolution and faster convergence.

It has been a great pleasure and a privilege to witness the development and applications of reconfigurable mechanisms and robotics in the past two decades following the development of metamorphic mechanisms in 1998. We expect that more work of these kinds will flourish in the near future to inspire and generate feasible and sustainable solutions for satisfying emerging engineering and technological demands/needs. Finally, we would like to express our sincere gratitude to the authors, reviewers, editorial board and publishers for their contributions and support to this Special Issue.

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