

*Cutting-edge Robotic Technologies and Applications Energized by Smart Materials and
Advanced Control (Code: inq55)*

Goal:

With the advance of intelligent technology, the research and development of cutting-edge robots has become an important hotspot. Studies on the stability, flexibility and efficiency of intelligent robots in multi-scenarios are the main research challenges and missions. Smart materials and structures boost new capabilities to robotics, which makes them present more vivid bionic behaviors, whereas the standard and high-efficiency manufacturing of robots by smart materials remains a challenge. With the development of manufacturing and material technologies, intelligent printing methods including 3D and 4D printing have become the mainstream robotic design/fabrication methods. In addition, the applications of smart materials such as multi-phase hydrogels and bistable materials also provide structural support in the fabrication of robots. On the basis of a series of advanced materials and structures, magnetic drives, electric drives and soft actuators have enabled numerous types of novel cutting-edge robots, to name a few, soft robotics and magneto-controlled robots, etc. Besides evolutionary actuators derived from smart materials, the motion planning and control are also regarded as the soul of robotic systems, facilitating the development of intelligent and autonomous robots, in which human-robot interaction and control, nonlinear control, closed-loop stability control have been major concerns.

Topics:

To contribute to those areas, this special session includes the following topics, but not limited to:

- Underwater/locomotion soft robots
- Bio-inspired robots
- Magneto-controlled robots
- Soft actuators and flexible sensors
- Motion planning for cutting-edge robots
- Stability and safety control
- Human-robot interaction and control
- Design of nonlinear observer and controller
- 3D and 4D printing technologies and systems for soft robotics
- Fabrication and characterization of smart materials for soft robotics

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