

Special Issue

Soft, Hybrid, and Wearable Actuation Technologies for Rehabilitation Robotics

Message from the Guest Editors

Rehabilitation robotics is undergoing a paradigm shift. Driven by the demand for patient-centered and adaptive care, the field is transitioning from the heavy, rigid exoskeletons of the past toward compliant, lightweight assistive technologies. This evolution is not just mechanical; it is a shift toward a more organic synergy between humans and machines. Soft actuators offer more than just intrinsic safety; they provide a high degree of adaptability to the human form. A pivotal advantage of these architectures lies in their comfort and ergonomics. Unlike rigid frames, soft components conform more naturally to the user's limbs, distributing mechanical pressure and minimizing patient pain. This Special Issue explores the cutting edge of these technologies, specifically focusing on: Recent advances in materials; Design methodologies; Sensing integration; Control strategies for soft, hybrid, and wearable actuation technologies applied to rehabilitation robotics. Emphasis is placed on **human-robot interaction**, biomechanical compatibility, and personalising therapy. Welcoming contributions on the interdisciplinary research across robotics, materials science, and clinical practice.

Guest Editors

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About the Journal

Message from the Editor-in-Chief

We are just entering the Next Wave of Technology (NWT) where actuators will play the same role as the computer chip did for computers/social media approximately four decades ago. Just in the U.S., production of \$1 trillion year of electromechanical systems (vehicles, orthotics, manufacturing cells, freight trains, aircraft, etc.) will be impacted by the NWT, all driven by actuators. Five key trends can be found for the future perspectives: “Performance to Reliability”, “Hard to Soft”, “Macro to Nano”, “Homo to Hetero” and “Single to Multi functional”. We invite papers that primarily impact these economic sectors; those illustrating basic scientific principles are also welcome.

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