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Call for Papers

IEEE Transactions on Robotics Special Issue on Wearable Robotics

Announcement of the special issue: January, 2020

Letter of Intent deadline: February 28, 2020

Paper submission deadline: April 30, 2020

Tentative publication date: February 2021
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Authors should indicate in their submission's cover note that they are submitting to the special issue on wearable robotics.

Scope:

This focused section aims at presenting the latest research advances and the future trends in the development of human-centered based approaches for controlling wearable robots for motion assistance and rehabilitation. While initially conceived for human motion augmentation purposes, wearable powered robots have been gradually proposed as technological aids for rehabilitation and assistance, and functional substitution in patients suffering from motor disorders. Over the last decades and despite the significant technological and scientific achievements in the field of wearable technologies, we have not yet witnessed successful projects pointing out subject-centered robotic suits, which are easy to wear and intuitive enough to cooperate with. Providing such pragmatic solutions or reducing the wearer dependency on external operator would have a great societal impact by improving the quality of life and regaining people Independence. In addition, technological advances and the emergence of wearable and ubiquitous technologies with considerable reduction in size, cost and energy consumption, are becoming privileged solutions to provide autonomous assistive services to humans. This challenging technology is expected to work closely, interact and collaborate with people in an intelligent environment. Thus, communicating the human body with the wearable robotic system requires robust and suitable interfacing solutions.

This special issue aims to gather researchers from different backgrounds to highlight the state of the art, the current and future trends of this highly interdisciplinary field. The accepted papers will provide discussions about the challenges and limiting factors for developing sustainable wearable robots for assistance and rehabilitation of human movements. The special issue aims at publishing original, significant and visionary papers describing the growing challenges of using novel human-robot multimodal interaction paradigms as these should consider both biomechanical and physiological features to allow for efficient and intuitive cooperative behavior. The special issue is also about understanding the recent trends to promote: energy harvesting, complete wearability, portability and reliability of the device, as well as user's safety. Challenges to be covered include efficient coupling and optimized transmission of power from the wearable device to the human body, and optimization of control algorithms for reduction and compensation of interface losses, among others. Submissions of scientific results from experts in academia and industry worldwide will be strongly encouraged.

In this context, the proposed special session is seeking relevant contributions addressing but are not limited to the topics listed below.

Topics to be covered include:

- Design of kinematically compatible wearable robots
- Advanced impedance-based control for wearable robots
- Human-in-the-loop-optimization algorithms for control of wearable robots
- Adaptive control for smooth physical human-robot interaction
- Torque control approaches for advanced neural interfaces with wearable exoskeletons
- Modular and decentralized exoskeleton design
- Design, control, and characterization approaches for soft wearable robots
- Innovative transmissions for wearable collaborative machines
- Design and test of powered exosuits
- Machine learning techniques for a smooth control of wearable robots

Paper submission and selection:

Interested authors are encouraged to submit no more than TWO IEEE pages A4 extended abstract to the guest editors (trowearablerobots@gmail.com) by February 28th 2020. Full Papers should be submitted by April 30th 2020. All submitted full papers will be rigorously reviewed and the selection of papers will be based on their originality, timeliness, significance and relevance to the scope of the special issue. Submitted papers should not be under consideration for publication anywhere else. More information on submitting can be found at <https://www.ieee-ras.org/publications/t-ro/information-for-authors>

The highest priority is quality, commensurate with the usual IEEE Transactions on Robotics standards.

Guest Editors:

- Juan C. Moreno, CSIC, Madrid, Spain
- Samer Mohammed, LISSI, UPEC, France
- Nicola Vitiello, BioRobotics Institute, Scuola Superiore Sant'Anna, Italy
- He (Helen) Huang, Closed-loop Engineering for Advance Rehabilitation (CLEAR) Core, NC State University, USA
- Conor J. Walsh, Harvard Biodesign Lab, Harvard University, USA

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