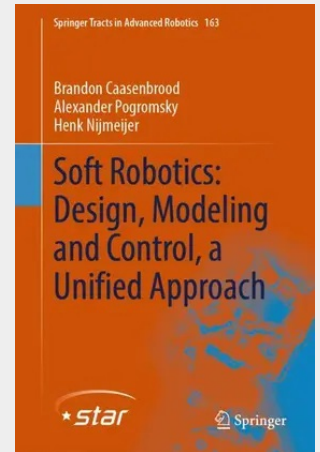


Soft Robotics: Design, Modeling and Control, a Unified Approach

This book provides a comprehensive and rigorous framework for the emerging field of soft robotics, addressing key challenges at the intersection of design, modeling, and control. Moving beyond traditional rigid-body paradigms, it explores how compliant materials enable new capabilities in dexterity, adaptability, and safe interaction, while simultaneously introducing significant theoretical and practical complexities. The volume presents a unified, multidisciplinary framework that integrates continuum mechanics, optimization, and control theory to systematically tackle the challenges of this rapidly evolving field. It introduces novel methodologies for the automated design and fabrication of soft actuators, advanced reduced-order modeling techniques grounded in differential geometry, and efficient model-based control strategies tailored to highly deformable robotic systems. Bridging theory and practice, the book demonstrates how these tools can be applied to real-world soft robotic platforms, including continuum manipulators and grippers inspired by biological systems. Experimental validation complements the theoretical developments, highlighting the feasibility of achieving both computational efficiency and control performance in soft robotic systems. By consolidating recent advances into a coherent framework, this work serves as both a reference and a foundation for future research, making it an essential resource for researchers, engineers, and graduate students working in the field of soft robotics.

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