

SPECIAL ISSUE

SURGICAL ROBOTICS AND COMPUTER-INTEGRATED INTERVENTIONAL MEDICINE

Edited by R. H. Taylor, N. Simaan, A. Menciassi, and G.-Z. Yang

835 Robot-Assisted Minimally Invasive Surgery—Surgical Robotics in the Data Age

By T. Haidegger, S. Speidel, D. Stoyanov, and R. M. Satava

| INVITED PAPER | This article summarizes the state of the art in robot-assisted minimally invasive surgery and provides an overview of key emerging technologies associated with next-generation systems.

847 Continuum Robots for Medical Interventions

By P. E. Dupont, N. Simaan, H. Choset, and C. Rucker

| INVITED PAPER | This article provides a unified summary of the state of the art of continuum robot architectures with respect to design for specific clinical applications.

871 Soft Robot-Assisted Minimally Invasive Surgery and Interventions: Advances and Outlook

By K.-W. Kwok, H. Wurdemann, A. Arezzo, A. Menciassi, and K. Althoefer

| INVITED PAPER | This article provides an in-depth overview of recent progress in soft robotics for surgery and outlines remaining challenges in the development of soft robotics technologies for in-body operation, such as materials selection, tunable stiffness, soft design paradigms, and control issues.

893 Robotic Assistance for Intraocular Microsurgery: Challenges and Perspectives

By I. i. Iordachita, M. D. de Smet, G. Naus, M. Mitsuishi, and C. N. Riviere

| INVITED PAPER | This article analyzes the advances in retinal robotic microsurgery, its current drawbacks and limitations, as well as the possible new directions to expand retinal microsurgery to techniques currently beyond human boundaries or infeasible without robotics.

909 Advancement of Flexible Robot Technologies for Endoluminal Surgeries

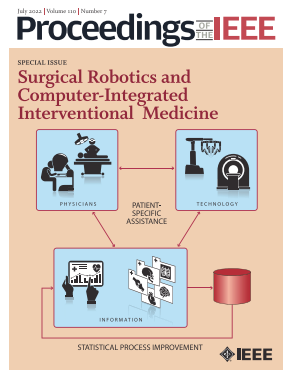
By J. Kim, M. de Mathelin, K. Ikuta, and D.-S. Kwon

| INVITED PAPER | This article covers the key technical issues in flexible surgical robotics, such as manipulator design, modeling, and control, and it introduces emerging flexible technologies organized according to their target application in the endoluminal surgical field.

DEPARTMENTS

823 SCANNING THE ISSUE
Surgical Robotics and Computer-Integrated Interventional Medicine
 By R. H. Taylor, N. Simaan, A. Menciassi, and G.-Z. Yang

1038 FUTURE SPECIAL ISSUE/SPECIAL SECTIONS



On the Cover:
 This month's cover image represents how humans and machines can partner to improve the safety, efficacy, and cost-effectiveness of surgical interventions.

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Interventional Medicine**

932 Image-Guided Interventional Robotics: Lost in Translation?

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| INVITED PAPER | This article provides an overview of the state of the art in image-guided surgical systems, together with a discussion of key issues for system developers in the translation of scientific research to clinical application.

951 Robot-Assisted Medical Imaging: A Review

By S. E. Salcudean, H. Moradi, D. G. Black, and N. Navab

| INVITED PAPER | This article provides an overview of the current state of the art and potential research directions for robotic imaging systems, with special emphasis on instances in which the accurate placement and trajectory control of the imaging system using a robot are of paramount importance.

968 State of the Art and Future Opportunities in MRI-Guided Robot-Assisted Surgery and Interventions

By H. Su, K.-W. Kwok, K. Cleary, I. Iordachita, M. C. Cavusoglu, J. P. Desai, and G. S. Fischer

| INVITED PAPER | This article describes challenges and history of robotic systems operating in an MRI environment, and outlines promising clinical applications and associated state-of-the-art MRI-compatible robotic systems and technology.

993 Concepts and Trends in Autonomy for Robot-Assisted Surgery

By P. Fiorini, K. Y. Goldberg, Y. Liu, and R. H. Taylor

| INVITED PAPER | This article provides a unified summary of the state of the art of the continuum robot architectures with respect to design for specific clinical applications and illustrates these themes with examples from current research.

1012 Haptic Feedback and Force-Based Teleoperation in Surgical Robotics

By R. V. Patel, S. F. Atashzar, and M. Tavakoli

| INVITED PAPER | This article examines key challenges associated with the application of haptic feedback and force-based teleoperation for surgical robots, such as instrumentation, fidelity, stability, and force-reflection modalities.

1028 Magnetically Actuated Medical Robots: An *in vivo* Perspective

By B. J. Nelson, S. Gervasoni, P. W. Y. Chiu, L. Zhang, and A. Zemmar

| INVITED PAPER | This article describes magnetically guided medical robots, both tethered and untethered, working at different scales and it analyses the *in vivo* translation with increased control and safety.

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