



Small-Scale Robotics inside the Human Body

Medical robotics has grown significantly over the last two decades in almost all the disciplines of medicine. Robots can aid the physician in several aspects: assisting diagnostic and surgery, performing a biopsy, dispensing medication, visualizing enclosed spaces inside the body, etc. More recently, there has been a rising interest in the miniaturization of these robots for less and less invasive or even non-invasive surgery. These miniaturized medical robots will allow making it possible to break down certain barriers related to the size and accessibility of some areas of the human body (vessels, arteries, deep intrapulmonary pathways, etc.). Such systems may provide many advantages, such as limited invasiveness, reduced trauma, or carrying out operations beyond the limits of the human precision or sensing abilities.

The development of such small size robots involves several disciplines including mechatronics, robotics, advanced materials, fabrication technologies, actuation, imaging small robots, etc. The eco-system created around the fundamental and technological issues related to small-scale robotics in medicine have led to the emergence of original and promising concepts, especially in the last few years.

This special issue aims to gather academic and engineers from different backgrounds to emphasize the state of the art, the current and future trends of this highly interdisciplinary field. IEEE Transactions on Robotics, through the guest editors of this special issue, invite to report the latest advances and recent accomplishments in this area related to miniaturized robotics for medical purposes, including (but not limited to) the following areas:

Topics

- Untethered small-scale robotics
- Active catheters and capsules
- Robotized endoscopic systems
- Continuum robots and needles
- Medical micro- and nanorobots
- Targeted therapy
- Origami for medical applications
- Novel actuators, sensors, and mechanisms
- New materials for micro and soft robots
- Sensor-based control and navigation
- Planning algorithms for intracorporal interventions
- Clinical translation of meso/micro robotic systems

Important Dates

- | | |
|--------------------|----------------------------------|
| • February 1, 2021 | Call for Papers |
| • June 1, 2021 | Deadline for Paper Submission |
| • October 1, 2021 | Completion of First Review |
| • February 1, 2022 | Completion of Final Review |
| • Early-mid 2022 | Publication of the special issue |

Guest Editors

Dr. Benoît ROSA: ICube, CNRS, Univ. of Strasbourg, France

b.rosa@unistra.fr

Dr. Brahim TAMADAZTE: ISIR, CNRS, Sorbonne Univ., France

brahim.tamadazte@femto-st.fr

Pr. Salvador PANE: Multi-Scale Robotics Lab, ETH Zürich, Switzerland

vidalp@ethz.ch

Pr. Jesssica BURGNER-KAHR: Continuum Robotics Lab, Univ. of Toronto

jessica.burgnerkahrs@utoronto.ca

Pr. Jake J. ABBOTT: Telerobotics Lab, Univ. of Utah, USA

jake.abbott@utah.edu

Handling Editor: Pr. Arianna MENCIASSI, The BioRobotics Institute, Scuola Superiore Sant'Anna, Italy

Submission and Review of Papers

Author information is available at the T-RO web site www.ieeeras.org/tro. Submissions should go to **T-RO PaperCept** at ras.papercept.net/journals/tro. Authors should mention in their submission cover letters that they are responding to the Special Issue call. T-RO considers also accompanying multimedia material. Papers submitted to the Special Issue can be Regular or Evolved papers, and undergo the usual T-RO review process. Instructions on the preparation of this material can be found on the [Information for Authors](#) page.