

## Editorial

# Surgical robotics and its development and progress

Surgical robotics is the study and application of advanced robotic technology to diverse surgical procedures, particularly to minimally invasive surgery. The advanced robotic technology in minimally invasive surgery leads to momentous change in and generates a tremendous impact on surgery, resulting in less pain and scarring, reduced blood loss and transfusions, lower risk of complication, shorter hospital stays and faster recovery periods.

Since the first surgical robot was initiated in 1985, surgical robotics has progressed for approximately 25 years with over 1000 surgical robots in regular clinical use worldwide and research and development at over 100 universities. In the next 25 years, surgical robotics promises huge progress comparable to the development of manufacturing robotics in industrial production over the past 25 years. The trend has been clearly indicated by the latest technology that provides superior visuals and enhances dexterity for the surgeon and by the worldwide market value expected to be \$5.7 billion by 2011 for medical robots and computer-aided surgery devices and equipment.

This special issue on surgical robotics presents readers in the fields of medical and robotics sciences with advanced robotic system development, diversified surgical applications and in-depth performance analysis. The system development provides a wide coverage of current research on surgical robotic systems, intelligent tooling, reconfigurable mechanisms and sensory-guided intervention including

magnetic steering and ultrasound-directed robotic surgery systems. The surgical application covers the use of robotic technology in laryngeal, gastrointestinal, abdominal and prostatic surgeries and in ablation and cryosurgery, leading to MRI- and functional MRI-compatible haptic interface and guided interventions. The performance analysis introduces surgical mechanism kinematics and dexterity, mathematical modelling and workspace evaluation, control architecture and error analysis, and design appraisal. The topics lead to modelling of both biomaterials and articular human joints. Review of the development of robotic surgery and that of robotics in urological surgery is further offered in the special issue.

The special issue reflects the joint effort in cutting-edge research from both surgeons and scientists and from both practitioners and theoreticians. The rich content and wide coverage make this special issue good reading material and a long-lasting reference for both surgeons and scientists working in the field of surgical robotics.

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