SMart weArable Robotic Teleoperated surgery

The Breakthrough

The SMARTsurg Team has designed and built a Robot Assisted Minimally Invasive Surgery demo unit. The project incorporates key novelties/ advances for the next generation of surgical robotics:

1. The perception of "feeling" the instrument in the hands is restore back to the Surgeons via the development of highly dexterous anthropomorphic surgical instruments and wearable hand exoskeleton with haptic feedback.
2. Active Dynamic Constraints using point cloud real time 3D reconstruction and wearable smart glasses for augmented reality allow the Surgeon to safely perform procedures in areas close to veins or critical organs.

The SMARTsurg demo unit has been evaluated by Surgeons for oncological, cardio-vascular and orthopedic procedures.

SMARTsurg main components

1. **Hand/wrist master controller for high dexterity slave instrument,** which tracks the motion of the thumb as well as the index and middle finger.
2. **Augmented Reality Toolkit,** in which we extract 3D models from manually annotated pre-operative MRI/CT scans using 3D slicer tools.
3. **Graphic User Interface,** which help the surgeon in locating targets (e.g. tumours) and critical structures (e.g. nerve bundles and vessels).
4. **Remote Centre of Motion,** which represents the kinematic constraint on the patient's abdonimal wall.
5. **High dexterity master-slave for minimally invasive surgery,** in which our anthropomorphic approach is based on creating a human-like grasping and manipulating tissue during surgery.

Project partners

University of the West of England, Bristol Robotics Laboratory, Information Technologies Institute, Politecnico Milano 1863, Bristol Urological Institute, University of Bristol, IEO European Institute of Oncology, TheMIS, cybernetix A TechnipFMC Company, Optinvent, HIT Hypertech Innovations

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