



Séminaires ISIR

Jeudi 10 Juillet 2014 à 10h30

Kaspar Althoefer

Campus Jussieu, 4 place Jussieu, Paris
Salle de réunion H20

Title: STIFF-FLOP: Soft and stiffness-variable robot manipulators - Taking the rigidity out of laparoscopic tools

Abstract: Over the last few years, one could observe remarkably steep technological and research advancements in the field of Robot-assisted Minimally Invasive Surgery (RMIS). Robotic surgical systems, such as Intuitive Surgical's da Vinci system have evolved to a level where they can now be used routinely in the operating theatre to assist surgeons when operating. These systems have shown to represent an alternative to laparoscopic surgery, at least for a number of procedures including prostatectomy. Its main advantage over existing techniques is that it allows surgeons to conduct complex procedures in an intuitive way while providing 3D views of the operating area. Limitations include rigidity of the manipulation devices (usually made from straight, rigid links), lack of tactile sensing modalities and haptic feedback. More recent research efforts have focused on creating surgical robots whose structure is flexible allowing the robot to follow more complex trajectories without negatively impacting on healthy tissue. Departing from these types of robots, which are fundamentally based on a structure made from rigid link elements, EU project STIFF-FLOP proposes a new concept of modern, inherently safe robots for minimally invasive surgery, capable of morphing between states of stiffness and softness. Inspired by the octopus, the project aims to create surgical robot systems, integrating soft and stiffness-controllable mechanisms, pneumatic and hydraulic actuation, tactile and force sensors, haptics as well as advanced control and learnable navigation techniques. The presentation will give an overview of the STIFF-FLOP project, the advancements to date and the challenges that lie ahead.

Short Bio: Professor Kaspar Althoefer is a mechatronics engineer, currently heading the Centre of Robotics Research (CORE) at King's College London. He joined the King's Robotics Group in 1996 as a Lecturer and is currently Professor of Robotics and Intelligent Systems. His research targets at increasing robot autonomy through embedded intelligence and falls in the areas of medical robotics and intelligent manipulation and grasping focussing on modelling of tool-environment interaction dynamics, sensing and neuro-fuzzy-based sensor signal classification with applications in robot-assisted minimally invasive surgery, miniaturised sensor development and steering systems for remote intervention in medicine. He is currently involved in several large-scale projects on robot-assisted surgery and medicine authentication funded by the EU, EPSRC and the Wellcome Trust. The total research funding awarded to him exceeds £ 4 Million, including £ 3 Million as Principal Investigator. Prof Althoefer has authored/co-authored more than 200 peer-reviewed papers and is named inventor on five patent applications. He is currently supervising a research team working on medical robotics, soft robots, intelligent grasping approaches for articulated hands and sensor developments.