Augmented Reality Application

The development of medical robots and manipulators is one of the research areas of the chair. A manipulator system for automated real-time imaging with ergonomic visualization of relevant information in an augmented reality environment is currently being developed.

In order to facilitate the surgeon's work, information from ultrasound images is projected onto the organ surface and displayed in a laparoscopic image in an augmented reality environment. For this purpose, the laparoscope camera and the ultrasound probe must first be calibrated before the operation. During the operation, information from the ultrasound image, e.g. a tumor, must be segmented, the information from the ultrasound images projected onto the organ surface and displayed in the laparoscope image in an augmented reality environment. For this, the organ surface must be recognized. Since the organ moves during the operation, the organ surface is tracked.

Within the scope of this work, a software framework for augmented reality applications in minimally invasive surgery in C/C++ and Matlab has to be implemented and documented with the integration of existing software components. Particular attention has to be paid to ensuring that the respective processing results are available within the specified period of time in order to enable the surgeon to work in real time. This has to be proven by runtime analyses. Finally, tests have to be carried out to prove the functionality and suitability of the software.

Prerequisites for the work are:
- Good knowledge and passion for image processing
- Independent operation
- Very good knowledge of C/C++
- Good knowledge of MATLAB and Java

Start of work: From now on

Proposals for accompanying courses: Automatisierungstechnik in der Medizin (Automation Technology in Medicine), Messtechnik und medizinische Assistenzsysteme (Measurement Technology and Medical Assistance Systems)

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