ARAS – Augmented Reality Aided Surgery

Project homepage: http://www.vrvis.at/br1/aras/

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Abstract:

The term "computer-aided surgery" (CAS, sometimes also called computer-assisted, computer-integrated or image-guided surgery) describes the usage of computer technologies in the operating theatre. Modern medical imaging techniques greatly simplify the task of diagnosis or intervention planning, but are still mostly applied in the pre-operative stage. CAS technologies close the gap between the pre-operative image and the resulting action in the surgical theatre.

The goal of the ARAS project is to aid the surgeon during intra-operative planning (in our case of a liver resection) by displaying pre-operative computer-tomographic data and intra-operative ultrasound (US) data as three-dimensional objects, using an optically tracked head-mounted display (HMD). The ARAS system works as an orientation guide for planning the operation or altering existing plans directly in the surgical theatre. It supports a close collaboration between surgeon and radiologist by providing an audio and video-link, and an appropriate, intuitive interaction interface for the registration and collaboration procedures performed by the radiologist. The radiologist can directly interact with the augmentation, thereby guiding and supporting the surgeon.

It demonstrates the combination of two AR techniques - a see-through HMD for the surgeon and video-based AR for the radiologist – and the application of an optical tracker for tracking in a sterile environment. Clinical trials are going to start later this year.

Preliminary prototype test in surgical theatre
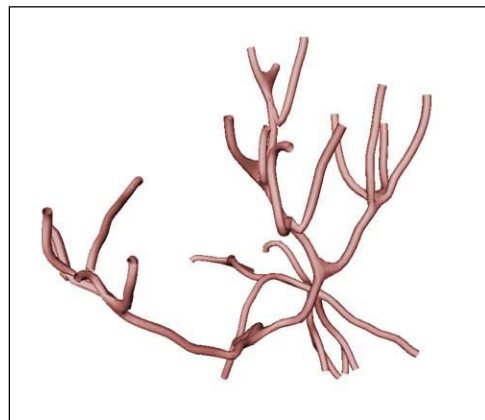
Polygonal vessel tree model reconstructed from CT data