

Microsurgery training in augmented reality

We have built a simulator in augmented reality for training microsurgical interventions. The simulator enables to display virtual structures, such as organs, and it tracks the location of the microsurgical device while the surgeon performs manipulation tasks on the virtual structures. The surgeon's performance is continuously monitored and used by the ITS to continuously customize the training task. In a first system (Fig. 1), we successfully implemented and evaluated the surgical procedure of peeling the internal limiting membrane (ILM) of the eye. Usability studies and experts interviews have revealed further requirements to be implemented in the existing system, such as the inclusion of pedals to control microscope functions or the simulation of complications during surgery.



Figure 1: Microsurgical simulator for training the procedure of peeling the internal limiting membrane of the retina. Includes an intelligent tutoring system improving efficiency of training. Microsoft's HoloLens is used as display technology. Continuous tracking and evaluation of micro-manipulations by means of an optical IR system.

Tasks

The aim of this student work is to analyze the use of specific controls in ILM surgery, to assist in the implementation of specific controls, and to test functionality of the new implemented controls. Your tasks are:

- Familiarize with the device and with a previous master thesis on a similar topic
- Design and conduct a systematical observation of the use of specific controls in ILM peeling
- Collect, analyze and discuss findings of the observation (e.g. by usability testing)
- Report findings in a written report and in an oral presentation

Requirements

- Motivated to work with augmented reality
- Organizational skills
- Have basic skills in statistics or willing to learn such skills

Support and contacts

The Human Factors Engineering group can provide a broad interdisciplinary technical and scientific support and has a solid experience in the many disciplines required to run the project. For further information please contact: mmenozzi@ethz.ch or rosandro@ethz.ch or call: 044 632 39 81 (M. Menozzi). Earliest start date is March, 1st, 2019.