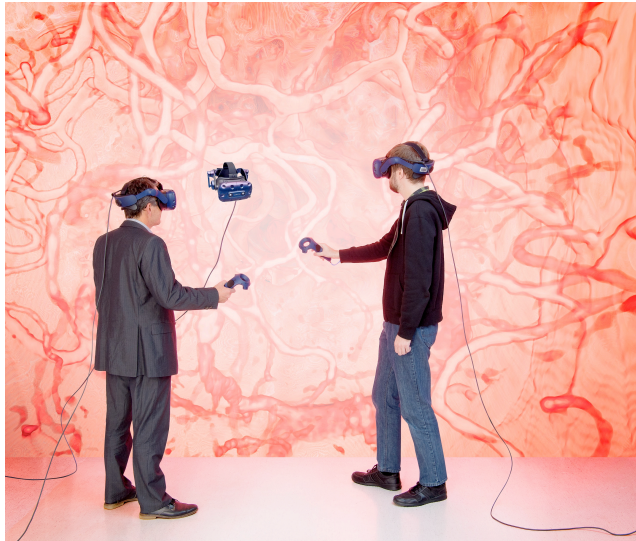


# The MIRACLE Project Planning & Navigation



SpectoVR for the 3D visualization of medical data sets can be used by several people in different locations at the same time (Werner Siemens-Foundation, F. Brüderli)

**The Planning and Navigation group develops innovative techniques to safely plan and control the surgical intervention of the MIRACLE robot.**

The planning system of the group is based on an in-house developed software called SpectoVR, which enables visualizing medical data sets in 3D using virtual reality (1). Due to the three-dimensional depth perception, the planning of osteotomies, with such a system, is more precise and intuitive, and therefore, also less time consuming compared to conventional intervention planning. Working with big volumetric data and state-of-the-art artificial intelligence methods, the group works on an algorithm for automated bone detection that will enrich SpectoVR, making the software even more performing. In the future, besides the planning of surgeries, SpectoVR will also be used to visualize the real-time progress of the intervention with the MIRACLE robot using augmented reality techniques.



Planning and Navigation Team (T. Schürch)

In parallel, the group also focuses on the development of innovative tracking systems (2,3), to precisely determine the physical position of the MIRACLE endoscope and its laser tip inside the body of the patient during the surgical intervention.

To aid tracking the laser tip, various signals and images acquired before and during the intervention, e.g. MRI, OCT, and acoustic waves of the laser ablation (4), are used for machine learning-based bone recognition and reconstruction methods.

To meet the requirements for such a diverse field of research the Planning and Navigation group is an interdisciplinary team of physicists, biomedical engineers, computer scientists, and mathematicians.

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