# Virtual reality in the service of medicine

One more pioneering study by FORTH (Foundation for Research and Technology - Hellas) which participates in the development of a novel system for patient-specific regional anesthesia.

Virtual reality not only conquers more and more of our everyday life, but also opens new horizons in science by supporting the improvement of diagnostic practices, therapy and treatment of illnesses. Once more, FORTH is a pioneer in this effort.

FORTH takes part in the development of a novel digital system, which trains medical doctors in the practice of Regional Anesthesia, i.e. focused in specific parts of the human body, with the assistance of a simulator. Additionally, FORTH also participates in the development of a system that will assist anesthesiologists during the actual operation.
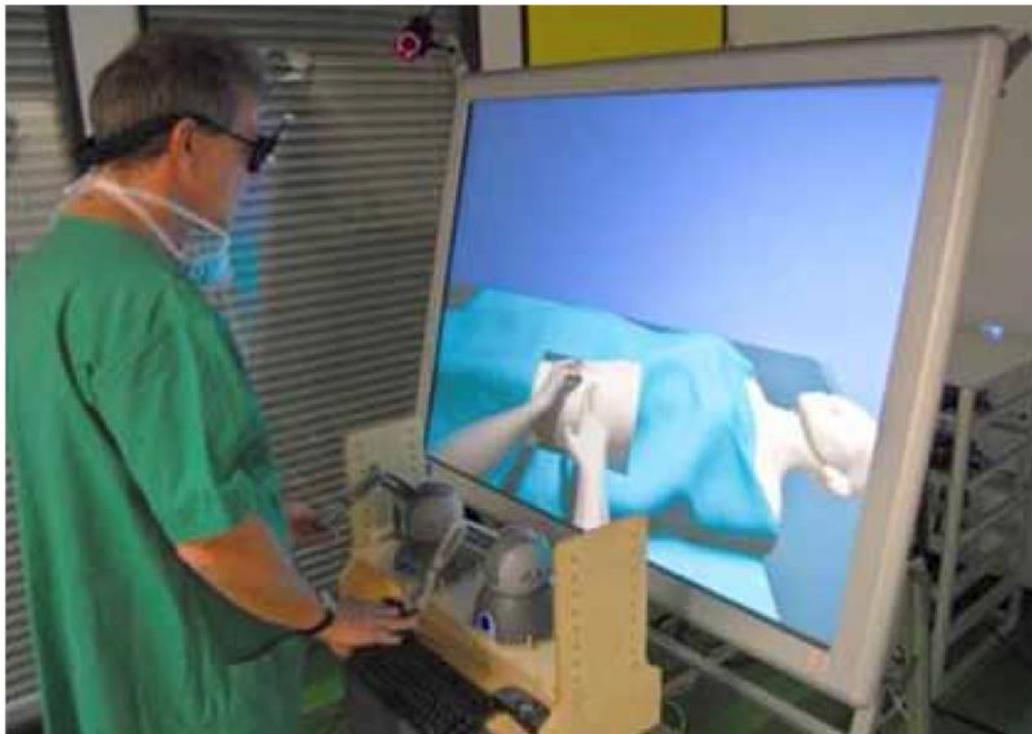
RASimAs

In essence, the research team develops a virtual reality platform that will assist doctors by providing a training environment for regional anesthesia and is expected to be a novel technological step in the near future. This ambitious plan is part of the research project RASimAs (Regional Anesthesia Simulator and Assistant) coordinated by Professor Thomas Deserno from the Department of Medical Informatics at Uniklinik RWTH Aachen (Germany) and the University Hospital of Aachen.

Fourteen academic, clinical and industrial partners from ten different European countries, including FORTH, are collaborating for this project.

What makes this project more interesting is that the application of regional anesthesia will be personalized for each patient, while at the same time it will provide a safer environment for medical practice and reduce the cost of medical practice. The information platform of this project will display, via virtual reality assistance, anatomical models fully self-adapting, as well as a system that will simulate the propagation of the local anesthetic's injection needle with the use of ultrasound, supporting in this way the application of peripheral anesthesia. Briefly, the system will be automatically adapt to patient specific anatomy based on existing imaging methods.

FORTH

FORTH takes part in RASimAs via the Computational BioMedicine Laboratory (CBML), coordinated by Dr Konstantinos Marias, a principal researcher of the Institute of Computer Science. Collaborator in this effort is the Translational Medicine Group of Dr Nikolaos Kampanis, research director of the Institute of Applied and Computational Mathematics. Dr Marias and Dr Kampanis emphasize the importance of their collaboration for the generation of versatile algorithms by using effective numeric algorithms for the solution of specialized medical imaging analysis problems like the correlation of image from ultrasound and magnetic tomography.

FORTH is also responsible for the design and implementation of the information platform for storing and interfacing data/models of all the RASimAs partners, having as a primary goal the secure information exchange and storage among partners, as well as the final integration of the individual computational models and medical images.

Low Cost plus effectiveness

Regional instead of general anesthesia

According to Georgios Notas, assistant professor at the University of Crete School of Medicine (Greece) who participates in RASimAs as a collaborating member of the Institute of Applied and Computational Mathematics, regional anesthesia could substitute general anesthesia in a large number of patients needing peripheral surgery due to its low cost and its beneficial effects in patient's full recovery. In practice this process requires the identification with a needle, of a particular nerve in the patient's body, in order to focus the injection of a local anesthetic to this nerve. The training for this procedure is extremely difficult and executed in anatomical manekins, various imaging systems or simply during practice. The designed virtual reality platform, together with the augmented reality platform that will assist in the correct propagation of the needle during regional anesthesia procedures, will provide direct training support to anesthesiologists and perhaps to other medical specialties in the future.

Additionally this platform will be immediately useful in the design and preview of specific anesthesia practices, plus something that is a very important a medical innovation; the design of regional anesthesia practices that will adapt to patient specific anatomical standards.