Simulated Surgeries Using 3D Models and Visual Feedback Software

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Technology description

Allows Medical Residents to Perform "Practice" Operations without Endangering Patients

These mixed-reality simulators, which include 3D models of body parts and real-time visual feedback software, allow medical residents to practice surgical techniques before operating on real patients. The 3D printed models are constructed from scans of actual patients' brains, spines, or other body parts, and are synched with corresponding virtual fluoroscopy images in the software program as well as an image guidance workstation to approximate a real surgery. Using this technology, a surgical resident can, for example, insert a needle into a model while monitoring the instrument's real-time movements on a virtual fluoroscopy screen; this closely matches the experience of performing a computer-assisted surgery. The ability to rehearse a series of surgical steps using realistically-weighted tools and receive immediate feedback, including numeric scoring of surgical objectives, can help residents improve their techniques in the virtual world, alleviating anxiety and eliminating risks to patients on operation day. Such hands-on education combined with appropriate accurate disease specific anatomy is preferable to watching many surgeries and then practicing on a few cadavers (the way most students currently learn) since it offers greater realism. The market for mixed-reality technologies is expected to grow to nearly $5.2 billion in 2016 with a compound annual growth rate of 95.4 percent.

Technology

This mixed-reality surgery simulator pairs models of brains made on 3D printers with images that correspond to surgical procedures. Researchers create the models by feeding MRI and CT scans taken from previous patients into 3D printers and covering the printed skulls with simulated skin covers. Surgeons-in-training can then, for example, insert a needle through the model's cheek and into the appropriate part of the brain while watching the needle's progress on an imaging screen, just as they would with a device called a fluoroscope during a real surgery.

Application area

Mixed reality system of 3D-printed models and visual feedback software for creating lifelike, realistic practice surgeries

Advantages

Effectively replicates the operating room environment, enhancing the quality of medical education with better simulated surgeries
Features guided instruction and immediate feedback, providing a competitive edge in medical training
Provides the advantage of a programmed learning experience, allowing for demonstration and training of new techniques and instruments
Includes lifelike 3D-printed models made from scans of actual patients and simulated fluoroscopy, giving residents a highly realistic experience
Allows users to make mistakes in a no-risk environment, promoting student learning and patient safety

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