2009-01-28 OSC NEWS: Haptic devices deliver more realistic and safer medical training (MTB Europe/Technology for Healthcare)

Haptic devices deliver more realistic, and safer medical training

28 January 2009

SensAble Technologies, Inc highlighted novel touch-enabled applications for medical training and simulation using the company's haptic devices and software at the Medicine Meets Virtual Reality (MMVR) conference in Long Beach California last week.

These include a skin cancer punch-biopsy training application already piloted by seven medical schools, and a spinal implant training application that prevents physicians from harmful radiation exposure. SensAble also is showcasing advanced haptic capabilities for medical simulation made easier by its just-released OpenHaptics version 3.0 software development toolkit for creating touch-enabled applications.

Surgeons need between 60 and 500 repetitions of a procedure to achieve proficiency1 — yet medical schools usually provide 10 to 20 repetitions on cadavers, with the rest of training left to supervised surgery. Touch-enabled computer simulation and training applications are on the rise as a practical way to enhance surgical training, reduce risks for patients and doctors, and measure proficiency.

Studies show that touch-enabled training where students use a precision force-feedback haptic device improves skill acquisition2, while presenting zero risk to patients, decreasing operating room and instructor time, and allowing clinicians unlimited practice in a realistic setting as their performance is measured and tallied.

"We have created several extremely realistic touch-enabled training applications using SensAble's haptic devices and software," said Don Stredney, research scientist at the Ohio Supercomputer Center and director of its Interface Lab. "We look forward to the integration of our efforts with SensAble's new APIs, specifically the depth of penetration feature in OpenHaptics 3.0. SensAble's products and software continue to provide cost-efficient solutions that promote the wider adoption of multimodal simulations for education and training."

Spinal Implant Surgery Simulator, created by Simulution for Zimmer Spine (formerly Abbott Spine) to train surgeons on the exact "feel" of the company's PathFinder spinal implant technology — with zero risk to patient or clinician. Extreme skill is required to tighten the pedicle screw that is used in the process of fusing vertebrae — yet traditional cadaver-based training approaches are risky, forcing surgeons to undergo long periods of exposure to radiation, as they learned to view the fluoroscopic image and determine the exact placement of the pedicle screw.

In Simulution's CyberSpine system, surgeons in training hold a SensAble PHANTOM haptic device in place of the canulation tool and screwdriver used to tighten the screw. The PHANTOM literally pushes back on the surgeon's hand, so they "feel" each step of the procedure. After "virtual surgery", the surgeon's performance is tallied and scored, and their progress can be measured over time.

"SensAble's artificial touch allows surgeons to repeatedly practice these high-risk surgeries in a very realistic environment, without the traditional constraints and risks," said Bruce D. Anderson, Ph.D., principal investigator at Simulution. "We see the use of haptics in our applications as a key component in helping us improve patient safety and outcomes through better surgical training."

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