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FOR IMMEDIATE RELEASE

Stanford University Creates a Touch-Enabled Virtual “Body Double” for Rehearsing Sinus Surgery Using SensAble’s Haptic Devices

Allows Surgeons to Feel Each Patient’s Unique Sinus Morphology As Shown on a Computer Screen for Better Surgical Rehearsal and Planning - At Zero Risk to Patient

WOBURN, MA August 11, 2009 –[SensAble Technologies, Inc.](http://www.sensable.com), the leading provider of haptic devices and touch-enabled modeling solutions, announced that its customer, Stanford University, has created a personalized touch-enabled 3D virtual environment for rehearsing endoscopic sinus surgery techniques based on SensAble’s PHANTOM® force-feedback haptic devices. As detailed in the new issue of the [American Journal of Rhinology & Allergy](#), the Stanford Rhinological Virtual Surgical Environment (VSE) demonstration project compiles the patient’s own pre-operative CT scans into a computer-based, touch-enabled 3D “body double” of the patient’s unique sinus morphology. Using the system, experienced surgeons can work by feel to digitally plan specific surgical pathways based on the patient’s actual anatomy, reducing the element of surprise during actual surgery. Additionally, residents can use the system to learn the feeling of the anatomical variability presented in a case, and train on techniques that best address a patient’s needs, with zero risk to the patient.

Stanford’s nine-person team is the first to touch-enable personalized surgical rehearsal using the patient’s own preoperative images – the ultimate in “AnatoME” – and the first solution to do so using standard, off-the-shelf “desktop” components. As detailed in the [journal article](#), Stanford’s system cost an estimated one-tenth of existing endoscopic surgery simulators which do not personalize the training experience, yet it delivers on-screen video at speeds close to those seen during actual surgery. Greater affordability can significantly increase the number of surgeons who have access to such systems, beyond just large teaching institutions, and signals a new era of vastly more personalized surgical planning and training.

“It’s extremely hard for students to thoroughly learn a specific patient’s sinus anatomy prior to a surgical procedure, given that the structures in this region are both highly complex and variable. We need safer and more effective ways to train than the traditional method of learning on live patients,” said [Dr. Nikolas Blevins](#), Chief of the, Division of Otolaryngology/ Neurotology at Stanford University School of Medicine who also maintains clinical research interests in emerging technologies for clinical imaging. “The integration of haptics in our simulator allows surgeons-in-training to actually feel and navigate the complex volumes and shapes that they will encounter during surgery. While we have many further refinements to make, our virtual surgical

environment demonstrates that it's indeed possible to transform the surgical planning process by creating an immersive training environment with haptics, which our preliminary findings characterize as extremely helpful."

In the paper, the authors explain that because vital organs such as the optic nerve and carotid artery are located near the sinus cavities, endoscopic sinus procedures can place the patient at risk of injury or death -- and can be daunting for even the experienced otolaryngologist. Individual anatomical variability in the human sinus region is high. Yet standard procedure for surgical planning in rhinology today is usually for the surgeon to view serial 2D CT scan images-- images whose cross-sectional views make it hard to spot and understand a patient's specific variations, let alone important elements of how they feel. The surgeon is still left to make the conceptual leap between static 2D cross-sectional images, and the actual 3D anatomy encountered during surgery -- without the benefit of patient-specific rehearsal.

In the Stanford study, the collaborators took multiple CT scans of the sinus cavities of two different patients -- then created a composite 3D display of each patient's anatomy on standard computer hardware, and touch-enabled those displays for the surgeons' practice. Instead of holding a computer mouse, the surgeon holds a SensAble PHANTOM® haptic device outfitted with an end effector that closely resembles a surgical telescope or endoscopic surgical instrument -- providing a realistic sense of touch as they probe the bony framework within the sinus cavity and mucosal structures. The authors explain how such personalized virtual models helped the surgeons on the team to feel, as well as to see, that patient's actual structure; to learn the location and feeling of "subtle surgically relevant landmarks" to guide their surgery; and to refine their options of how to handle - literally - various surgical approaches before the patient is lying on the table.

"Currently, there is no intuitive way for ear-nose-throat surgeons to interact with data from preoperative images, and certainly no way to learn the feeling of internal anatomy prior to operating on patients," said [Kenneth Salisbury, Ph.D.](#), haptics expert and professor in the Departments of Computer Science and Surgery at Stanford University and noted pioneer and expert in haptics. "While further validation is needed, we believe that our surgical simulation environment represents an important step toward enabling surgeons to rehearse procedures with patient-specific data, and may provide a considerably more rich means for pre-operative preparation."

"Someday soon, consumers will be asking their doctors to cite how many times he/she has rehearsed their surgery on their own virtual body double -- not simply how many times they've performed the procedures on other people," said Dr. David Chen, chief technology officer at SensAble Technologies. "Stanford's work is at the forefront of patient-specific surgical planning, and builds on the increasing use of touch-enabled virtual training systems. Haptics provides an important sense of realism to these systems, and we believe the results will be better trained surgeons and better patient outcomes."

About SensAble Technologies

Founded in 1993, SensAble Technologies is a leading developer of 3D touch-enabled (force feedback) solutions and technology that allow users to not only see and hear an on-screen

computer application, but to actually “feel” it. With 41 patents granted and over 7,000 systems installed worldwide, SensAble Technologies' haptic technology is being used in applications ranging from designing toys and footwear, to surgical simulation and stroke rehabilitation, to dental restorations, as well as a range of research and robotic applications. The company markets its own 3D modeling solutions as well as its haptic devices and developer toolkits to medical, dental, design, and manufacturing companies; educational and research institutions; and OEMs. SensAble products are available through direct and reseller channels worldwide.
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