

# **ORTHOPAEDIC CARE 2008 CONFERENCE**

## **The Perk Station: Portable training station for percutaneous interventions**

*Paweena U-Thainual<sup>1</sup>, Iulian Iordachita<sup>2</sup>, Siddharth Vikal<sup>1</sup>, Gabor Fichtinger<sup>1,2</sup>*

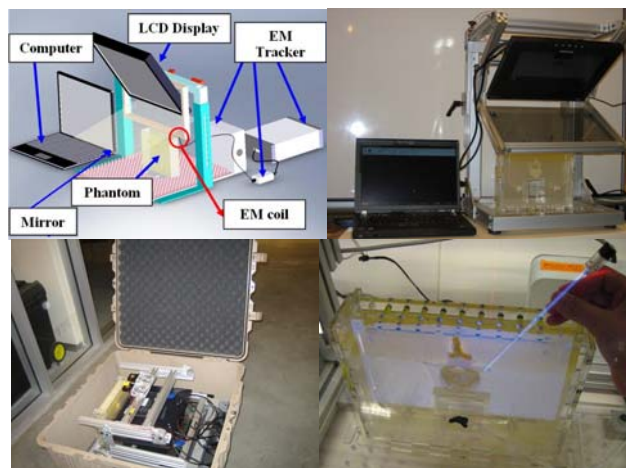
*<sup>1</sup> School of Computing and Mechanical Engineering  
Queen's University  
Kingston, ON, Canada*

*<sup>2</sup> Center for Computer Integrated Surgery  
Johns Hopkins University  
Baltimore, MD, USA*

Contact information: Paweena U-Thainual  
Faculty of Applied Science, Queen's University  
Laboratory for Percutaneous Surgery  
#233 Goodwin Hall, 25 Union St.  
Kingston, ON, K7L 3N6, CANADA  
Email: [paweena@cs.queensu.ca](mailto:paweena@cs.queensu.ca)  
Phone: (613) 533-6000 Ext. 74201  
Fax : (613) 533-6513

## The Perk Station: Portable training station for percutaneous interventions

Image-guided percutaneous needle-based surgery has become part of routine clinical practice in performing procedures such as biopsies, injections and therapeutic implants. A novice physician typically performs needle interventions under the supervision of a senior physician; a slow and inherently subjective training process that lacks objective, quantitative assessment of the surgical skill and performance. Current evaluations of needle-based surgery are also rather simplistic: usually only needle tip accuracy and procedure time are recorded, the latter being used as an indicator of economical feasibility. Shortening the learning curve and increasing procedural consistency are crucially important factors in assuring high-quality medical care for all segments of society. The design and development of a laboratory validation system for measuring operator performance of different assistance techniques for needle-based surgical guidance systems - the Perk Station is described. The Perk Station measures operator performance using a variety of techniques with the initial focus on the following: the image overlay, bi-plane laser guide, and traditional freehand. The system comprises of the assistance device (i.e. overlay of laser guide), a magnetic tracking system, a tracked needle, a phantom, and a stand-alone laptop computer. The graphical interface allows the user to select an insertion path on the anatomical images, display the needle trajectory on the image overlay, and report the insertion depth, angle. The modular phantom houses various target configurations and is constructed with transparent gel that allows the user to visualize the error after the needle insertion. The prototype Perk Station has been successfully developed, the associated needle insertion phantoms have been built, and the graphic surgical interface has been implemented. The Perk Station is transportable and fits in a suitcase.



(top left) CAD design of the Perk Station with image overlay, (top right) actual prototype, (bottom left) the Perk Station fits in a suitcase, (bottom right) needle insertion in spine phantom