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## Enhancing the immersive reality of virtual simulators for easily accessible laparoscopic surgical training (Proceedings Paper)

Author(s): **Kyra McKenna; Karen McMenemy; R. S. Ferguson; Alistair Dick; Stephen Potts**

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#### Proceedings Vol. 6804

**The Engineering Reality of Virtual Reality 2008**, Ian E. McDowall; Margaret Dolinsky, Editors, 680402

Date: **8 February 2008**

#### Paper Abstract

Computer simulators are a popular method of training surgeons in the techniques of laparoscopy. However, for the trainee to feel totally immersed in the process, the graphical display should be as lifelike as possible and two-handed force feedback interaction is required. This paper reports on how a compelling immersive experience can be delivered at low cost using commonly available hardware components. Three specific themes are brought together. Firstly, programmable shaders executing in standard PC graphics adapter's deliver the appearance of anatomical realism, including effects of: translucent tissue surfaces, semi-transparent membranes, multilayer image texturing and real-time shadowing. Secondly, relatively inexpensive 'off the shelf' force feedback devices contribute to a holistic immersive experience. The final element described is the custom software that brings these together with hierarchically organized and optimized polygonal models for abdominal anatomy.

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