

Dr. Greg Ruthenbeck

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Just like a scene from a science fiction movie, Greg Ruthenbeck has spent the past four years of his life developing cut-able soft-tissue simulation effects for virtual reality surgical simulations using haptics technologies.

Working with Professors Karen Reynolds and Simon Carney on the Flinders Endoscopic Sinus Surgery Simulator, Greg is working on technology specifically designed to assist trainee surgeons, garnering attention from surgeons and medical personnel around the world.

Discovering that tissue simulation can effectively use programmable graphics processing units (GPUs), providing hundreds of cores and far greater processing power than CPUs, Greg says this new technology has enabled him to simulate tissue dynamics in real-time.

A critical component lacking from the toolbox of medical simulation developers, these GPUs have formed the basis of interactive tissue simulation at the core of the Flinders Endoscopic Sinus Surgery Simulator.

Having worked as a software developer in the simulation industry since 2002, Greg's body of work includes the development of medical and defense simulators including ISim: A VR Haptic Endotracheal Intubation Simulation, a tonsillectomy simulation, haptic games for high-school students, and a haptic VR skull jigsaw for learning the complex anatomy of the human skull.

Greg's work to date on the Sinus Surgery Simulator won him the award for Best Student Presentation in 2009 at the IEEE/CSIRO Science Symposium, and has received positive feedback from surgeons and medical personnel nationally and internationally.

Currently working on integrating tissue models, haptic and visual rendering systems, Greg intends for the project to be finalised early next year for use in surgery training.

Once complete, the software will be trialed in Australia's five major ENT surgery-training centres, where Professor Karen Reynolds' team will collect feedback about the practical effectiveness of their simulation technology. Greg also believes it will equally benefit experts by providing them with a risk free environment to practice new techniques.

Kicking off his involvement in haptic technology, eResearch SA provided Greg with his first access to haptic hardware in 2005 when he borrowed a Phantom Desktop haptic device, complete with haptic workbench. ▶

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eResearch SA was also responsible for providing access to a VR 3D laptop, introducing the hardware required for delivering portable VR medical training systems to the VR medical simulation research team at Flinders University well before 3D went mainstream.

“In addition to eResearch SA’s technical support, we have also been able to engage high-calibre students for our research through their summer scholarship program,” says Greg.

“This type of funding has afforded us the freedom to better engage students from other disciplines (e.g. Humanities) with the skills needed to open up new directions for our simulation research.

“Our experience with eResearch SA has been very positive – they have provided access to cutting edge technology and support for our simulation research,” he continues.

“Through the scholarship program they’ve also enabled our research group to grow and explore new directions, strengthening and expanding our capabilities.”

