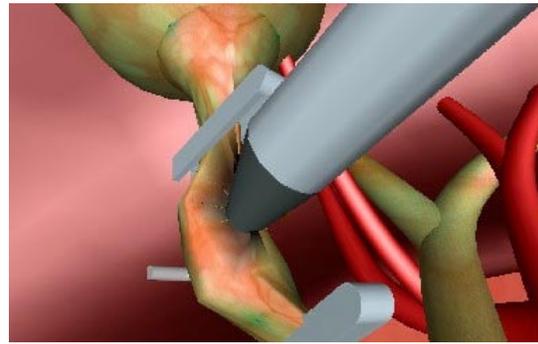University of Central Florida
3280 Progress Drive, Orlando, FL 32826
(407) 882-1300 www.ist.ucf.edu

Endoscopic Surgery Simulator

An extensible, interactive endoscopic surgery simulator under development at IST will allow students of the technique to interact with a realistic, texture-mapped CAD model of the human body with virtual instruments in real-time. Magnetic position trackers will be used to track position and angle of the instruments and adjust the position of the virtual instruments accordingly. A realistic "feel" for the procedure may be achieved by having the trainee insert tools into a mock torso. *A monitor is updated in real-time, based on such viewing functionalities as error detection and deformable organ surfaces.*

The benefits of such a simulator are numerous. Surgeons would be able to train more often. Animals would not be used in the training process. It would be possible to objectively grade each surgeon's performance in the simulator to determine if they have mastered the skills required for this type of operation.

Within a simulated environment it is also possible to practice surgical accidents and other complications without endangering lives.

Methodology:

1) *Identify endoscopic skills.*
With the knowledge gained from the literature search, interaction with local surgeons familiar with the procedure, and participation in live animal training endoscopy sessions, IST scientists will be able to identify the key endoscopic skills and determine which of these are feasible to implement in the prototype.

2) *Extend software libraries to support surgery simulation.*
Add functionality to IST's existing virtual environment software libraries that will allow the simulation of endoscopic surgery and reinforce the necessary skill set previously identified. Implement an algorithm to position operator's viewpoint at the end of the virtual endoscope. Devise code to govern the motion of the virtual surgical implements within the simulation. Design and implement a natural means for the surgeon to alternate among several instruments during the simulation. Create three-dimensional CAD models of the human torso and basic endoscopic instruments.

3) *Modify the Virtual Environment Testbed to support surgery simulation.*
Rearrange the existing testbed to resemble an operating theater. Devise or purchase a mock torso to provide visual realism and haptic cues during the simulation. Such a torso should allow the insertion of endoscopic instruments in several locations.

Contact: Michael Dolezal
Phone: (407) 882-1340
E-mail: mdolezal@ist.ucf.edu

Mission: ■ Be a focal point for the expanding modeling and simulation community ■ Develop and conduct M&S research and related services ■ Identify M&S directions and trends ■ Facilitate moving M&S into new areas ■ Be a research and development access point to industry for technology transfer ■ Create and participate in partnerships ■ Provide an environment conducive for student and faculty participation in M&S research and development ■ Provide continuing education services.