

Presentation Title: Computer-assisted surgical training: simulation modeling based approach

Healthcare is changing at a very rapid pace. So does its attendant complexity and ever-increasing reliance on high technology support. Simulation in healthcare, where sophisticated, technology-based methods are used in education of healthcare professionals and in treatment of patients, is becoming a recognized branch of knowledge and practice. Such methods require a new generation of engineers, scientists, systems designers, modelers, and physicians to integrate medical and technical domains. This talk will provide an overview of modeling and simulation, and systems engineering technologies as applied to healthcare and more specifically, to surgical training. A historical perspective will be given, followed by the discussion of how simulation helps in gaining professional competency and how it helps improve healthcare outcomes. A new surgical training and assessment system that provides sensing and reasoning capabilities in laparoscopy education will then be discussed. Laparoscopy is a surgical technology that can minimize recovery time and postoperative pain. However, with this procedure surgeons lose many of the tactile and visual cues that they rely upon in conventional surgery, thus it is of paramount importance that they initially train in a non-patient based setting. The system, called CAST (Computer Aided Surgical Trainer) implements sensors, image processing, machine learning, and augmented reality techniques to provide real-time guidance and training assistance. Future research work will focus on developing the technology as a robotic surgical assistant system for use in the operating room.