Remote Real Time Simulation for Anatomy and Surgery Education

Parvati Dev, PhD
Associate Dean, Learning Technologies
Director, SUMMIT Research Laboratory
Stanford University School of Medicine

Steven Senger, PhD
Professor
Computer Science and Mathematics
University of Wisconsin, La Crosse
Lessons learned on the Internet Highway

NGI
Overview

- Objectives of our research program.
- Features of net-aware applications.
- Measurement of end-to-end performance.
- Lessons learned.
Our objectives

• Applications that utilize power of Internet/NGI
  – We did not repurpose existing applications
  – We created a set of applications that exploited different aspects of Internet2/NGI but were pedagogically useful
  – We integrated networked haptics as a novel modality for sensing and learning that challenged the performance of the network
Our objectives

• Applications that utilize power of Internet/NGI
• Focus on medical education
  – Universities are able to set up large server-based resources
  – Students usually use medium or low end computers to access learning resources
  – This challenges us to create a scalable solution where a range of client capabilities can be used to reach numerous and varied learning resources
Our objectives

- Applications that utilize power of Internet/NGI
- Focus on medical education
- Use Internet to link developers and evaluators
  - The Stanford SUMMIT lab
    - project definition and management
    - lab and field testing and evaluation
  - Development at
    - Stanford-NASA Biocomputation lab
    - University of Wisconsin
    - Texas Tech University
  - Design and manufacture of laparoscopic surgical manipulators
    - Immersion Corp (San Jose/ Montreal)
  - End-to-end performance assessment of networked applications
    - The Stanford Electrical Engineering Department
  - Evaluations of the educational use of simulators
    - Education evaluation experts at Stanford and Pittsburgh
Haptics and stereovision
Achievements: networked applications

- We designed and implemented networked applications for
  - Anatomical Education
  - Surgical Simulation

- “Real Time Remote Simulations for Anatomy and Surgery Education”

- (These applications will be presented by Dr. Senger)
Achievements: Evaluation

• We tested the applications for performance over simulated and real networks
  – Developed a generalizable method for end-to-end performance testing

• We evaluated the efficacy of some applications for learning
Achievements: Curricular integration

• Human Anatomy curriculum for medical students
• Surgical simulations in process of curricular integration
• Real-time event-based learning environment
  – integrate numerous applications
  – lead to a new generation of pedagogic methods
Achievements: Distributed team

• We were successful in
  – Creating a distributed team that worked well together.
  – Operated over I2.
  – Achieved the goals of the project.