

NRI: FND: Customizable, Haptic Co-Robot for Training Emergency Surgical Procedures

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Challenges in Training Trauma Surgical Skills

Needle Decompression



Chest Tube Placement



- Requires excellent spatial coordination
- Correct tool placement depends on sense of touch
- **Emergent nature** of trauma limits time for teaching

Long-Term Goal: Augment Mentored Complex Skill Acquisition through Shared Haptic Guidance



Specific Aims:

- 1) Kinematic and Kinetic Sensing for Trainee-Patient Interactions
- 2) Intuitive Haptic Guidance for Tool Manipulation by Trainees
- 3) Evaluate Effectiveness ofHaptic Co-Robotic Training



Preliminary Work Towards Aim 1: Kinematic and Kinetic Sensing for Trainee-Patient Interactions

Scientific Objective:

Develop Analytical Techniques to Minimize Necessary Sensors

Goal: Simple, Unobtrusive Sensing System







Next Steps: Apply Similar Techniques to Force Sensing

cHand

Preliminary Work Towards Aim 2: Intuitive Tactile Guidance Cues for Tool Manipulation

Haptics Symposium 2016 – Best Paper Finalist



(P)



Up/Down Guidance Cues





Tool Space cues had least error and highest user acceptance.



Preliminary Work Towards Aim 2: Intuitive Tactile Guidance Cues for Tool Manipulation

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Up/Down Guidance Cues





Tool Space Pitch Forwards/Backwards





Next Steps: Study 3D Guidance and Develop Mentor-Trainee System