Robotic Surgical Training
A Comparative Human-centric Analysis of Virtual Reality Simulation and Physical Dry Lab Exercises

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Virtual reality and dry lab simulation to train surgical residents

- Robotic-minimally invasive surgery (RMIS) is being adopted in an increasing range of surgical specialties
- Surgical training systems developed to overcome the steep learning curve
- Are virtual reality and dry lab training skills learned interchangeable?

Measuring human operator kinematics and physiological response

Data Collection:
- Total of 72 individual experiment trials containing human physiological response signals
  - Surface muscle electromyography (EMG)
  - Electrodermal response (EDA)
  - Motion kinematic data of user dominant and non-dominant arms: position, angular velocity, and linear acceleration collected from electromagnetic (EM) and inertial measurement unit (IMU) sensors.

Feature analysis between physical and simulated training exercises

- Significant differences (p-value < 0.05): muscle activation, path length, and economy of volume