A Graphical User Interface for Inanimate Training on the da Vinci Surgical System

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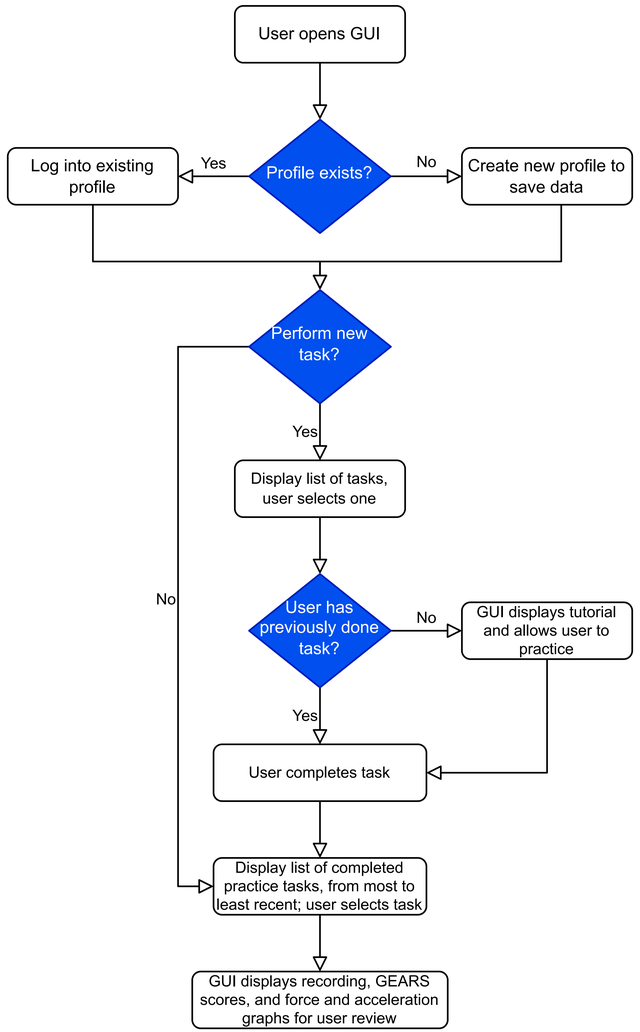
Introduction

- Robotic minimally invasive surgery (RMIS) has become the gold standard for many procedures
- Few opportunities for surgical trainees to self-assess training task performance
- Previous work in the HAMR Lab showed that skills acquired in VR do not fully translate to benchtop performance with physical tasks
- Currently, experienced surgeon required to evaluate trainees using Global Evaluative Assessment of Robotic Skills (GEARS); however, this can be time-consuming and costly
- Our system provides objective, metrics-based assessments for trainees to independently evaluate their performance in repeated trials

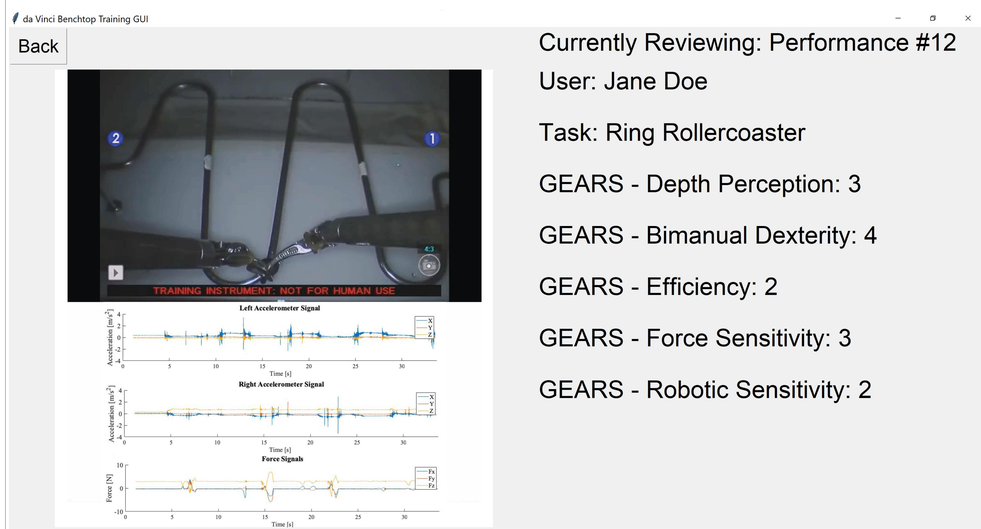
Objectives

- Design GUI for surgical residents training on da Vinci
  1. Receive instructions on different tasks
  2. Record performance via the laparoscopic camera
  3. Re-watch performance to identify opportunities for improvement
- Integrate GUI into existing data collection system
- Rate each performance automatically using GEARS scores by integrating machine learning approaches currently under development
- Enable real-time, tunable haptic feedback during training

User Experience Flowchart



GUI Prototype



Software

- Robot Operating System (ROS)
- Automated GEARS rating system processes data using MATLAB
- GUI developed in Python 3 using Tkinter

Next Steps

- GUI testing with surgical residents at the Johns Hopkins Minimally Invasive Surgical Training and Innovation Center (MISTIC) for feedback on usability, design, and desired features
- Evaluate benchtop training with the GUI compared to benchtop training without the GUI

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