

Visual Feedback for Skill Acquisition in Cataract Surgery

- Currently, feedback to support technical skill acquisition among trainees in ophthalmology is through qualitative verbal instruction and demonstration. Directed feedback can facilitate deliberate practice and effective skill acquisition. This project aims to develop visual feedback to support technical skill training in cataract surgery during task performance. This work is based on the hypothesis that adequate control of tool forces during the critical step in cataract surgery is essential to safely and effectively perform the surgery.
- **What Students Will Do:**
 - Setup a simple phantom to simulate a critical task in cataract surgery
 - Develop visual overlays to display tool force vector at any point in time during the task, working with the *da Vinci* Research Kit
 - Compare patterns in tool forces between task performed by an expert and novices
 - (Optional goal: Estimate tool force using video images of task performance)
- **Deliverables:**
 - Simple phantom to simulate task
 - Visualization of tool forces
 - Preliminary comparison of patterns between expert & novices
 - (Optional): error in estimated tool forces
- **Size group:** 2 or 3
- **Skills:** C++, Python, ROS (desirable), Computer vision
- **Mentors:** Austin Reiter; Swaroop Vedula

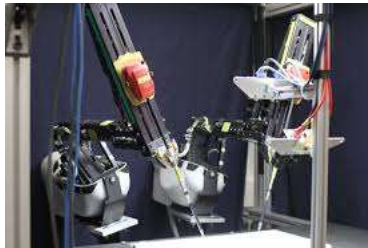
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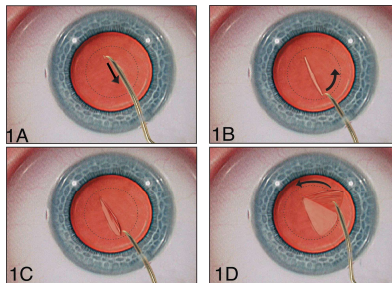
The robot (data source): *da Vinci* Research Kit



<http://cal-mr.berkeley.edu/images/media/DVRK-2-high-res.jpg>

1. Prepare simple phantom to simulate capsulorhexis
2. Capture tool motion & video with dVRK
3. Visual overlay of tool forces during task performance
4. Compare tool force patterns between expert and novices

The surgical task: Capsulorhexis



Additional (optional) goal:

1. Estimate tool forces using video images
2. Determine error in this estimation

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