Robot Control Algorithms Based on Sclera Force Information

- This project aims to extend the Eye Robot (ER) control algorithms for safe robot-assisted micromanipulation based on sclera force/position feedback.

What Students Will Do:
- New control mode(s) with admittance variation (linear or non-linear) along the insertion depth.
- Set an experiment with dry phantom, single subject experiments, statistical analyses (MATLAB).

Deliverables:
- Software: C++ code, Experimental setup.
- Experimental results that demonstrate feasibility.

Size group: 2 people

Skills:
- Required: Good analytical skills, Programming (Matlab, C/C++), CAD.
- Desired: Control Theory, Electronics, Prototyping.


JHU SHER: SHER 2.0 and 2.1 adjacent to operating microscope (top); two instruments held by the robots, inserted through sclerotomies of a phantom eye (bottom).

Dual force sensing instrument, (a) tool shaft dimension; (b) section view of the tool shaft with the FBG sensors; (c) geometry related to tool calibration; (d) dimensions of a single fiber with three FBG sensors.

Admittance variation (linear or non-linear) along the insertion depth. The section between \( l_{1B} \) and \( l_{1u} \) is the transition between pure force scaling of the sclera force and pure RCM.