Telerobotic Eye Surgery Pillow

Michael Bowcutt, Stefan Dancy, Cody Farnsworth, Jimmy Pena,
Advisor: Dr. Jake Abbott

Project Purpose: Improve telerobotic eye surgery procedures by redesigning the standard headrest to reduce relative motion between the eye and an eye surgery robot mounted to the patient’s head.

Customer Needs:
- Reduce relative motion between eye and robot.
- Attach to standard operating bed.
- Accommodate 95% of patients with modular design

Analysis:
The function of this design must be to reduce reactive forces that cause scalp displacement, as shown in Figures 2 and 3.

Design Solution:
- Constant force springs: Used to optimize the support provided by the headrest.
- Sarrus mechanism adds damping to the system and keeps base plate balanced.
- 80/20 parts constitute the frame, allowing modular design and quick design changes after testing and analysis.
- Connection point: Designed to slide into existing headrest.
- Baseplate: Used to rest the existing headrest pillow

Results:

Metric 1: Average results show improvement, but fall short of 95% confidence intervals.

Metric 2: The current design successfully suppresses reactive forces during potential excessive motion.

Metric 7: Results prove the implementation of this headrest design increases opportunity of successful telerobotic eye surgery.

Conclusion: Through various forms of testing, (measuring reactive forces and relative motion of simulated patient movement) it is concluded that the current design of eye surgery pillow successfully decreases relative motion to enable more precise telerobotic eye surgery.

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