

Laparoscopic Articulating Arm

in collaboration with the Xenocor Saberscope



Zac Hastings, Lizbeth Pugliese, Rebecca Sweeten,
Dallin Thomas, Dallin Treasure-Areno
Utah State University

Michael Bills, Jonathan Bruns, Brandon Kessler,
David Van Ness, Tony Watson
Xenocor

Dr. Ronald Sims
Utah State University

Background

- *Laparoscopy* a minimally invasive procedure performed through small incisions using a laparoscope, a camera-equipped instrument, along with specialized tools.
- *Laparotomy* or "open" surgery, requires a large incision to perform an abdominal operation.

Benefits of Laparoscopy:

- Reduced Pain and Scarring
- Faster Recovery
- Lower Infection Risk
- Ideal for High-Risk Patients.



Figure 4. A visual comparison of the first iteration of the holster design to the current minimum viable product design

Methods

Design Research (including surgeons)
Three parts for design

- **Holster**
- **Arm**
- **Base**

Create **Minimum Viable Product**
Pick **Design Material**
Perform **User Study**
Design of **Robotic Controls**



Figure 1. Forth iteration of the holster for the viable product. In this design the laparoscope clips into the holster.

User Study

Objective: Evaluate the usability and effectiveness of an adjustable positioning arm for laparoscope placement.

Procedure:

- Participants inserted and adjusted a laparoscope in simulated surgical ports.
- The positioning arm was adjusted for stability and fine-tuning.

Positioning Arm Usability

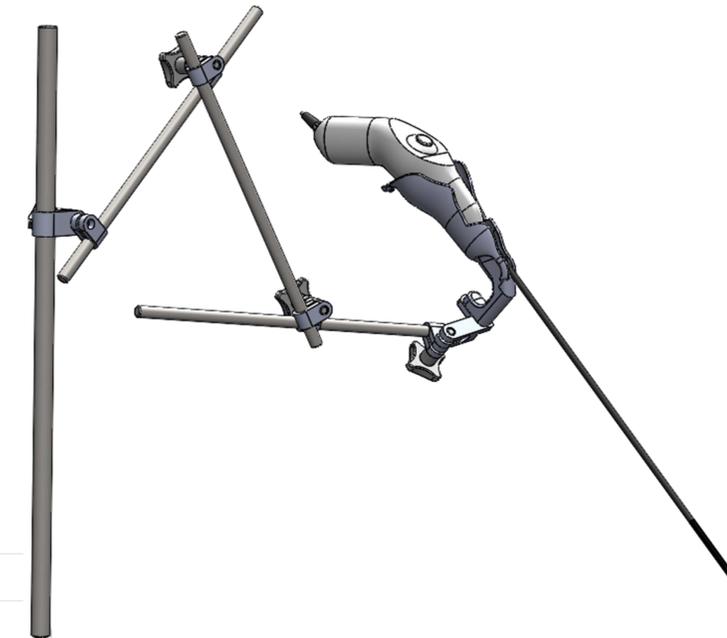
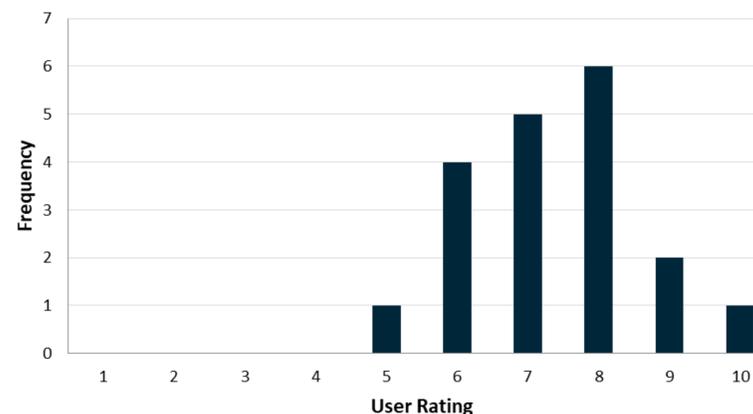


Figure 2. Combined project SolidWorks mockup with the laparoscope inside of the holster



Figure 3. Clark socket used to attach the positioning arm to the surgical bed

Summary

This innovative arm-holster system transforms surgical workflow by acting as an additional team member in the OR. While seemingly simple, this solution:

Key Impacts:

- Reduces cleaning costs and waste
- Cuts procedure time by eliminating device juggling
- Enhances patient outcomes through improved surgical focus
- Significant cost savings through reduced OR time and staff needs

- Use in developing countries with limited staff

Future Directions:

- Completion of robotic controls
- Further development of robotic control of laparoscope for potential integration with AI-assisted surgical navigation or VR assisted surgery

The Bottom Line: Sometimes the simplest solutions create the biggest impact. By giving surgeons back their hands, we're giving patients better care.

References

- (1) *What Are The Main Types Of Surgical/Operating Room Table Clamps and Sockets?* | Meditek. MEDITEK. <https://www.meditek.ca/main-types-surgical-operating-room-table-clamps-sockets/> (accessed 2024-10-31).