

Probe Holder Design Team Mid-Semester Presentation

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Overview

- Background
 - Ultrasonography
 - Previous work
- Client Feedback
 - Design Alternatives
- 2nd Generation Prototype
- Future Work
- Questions

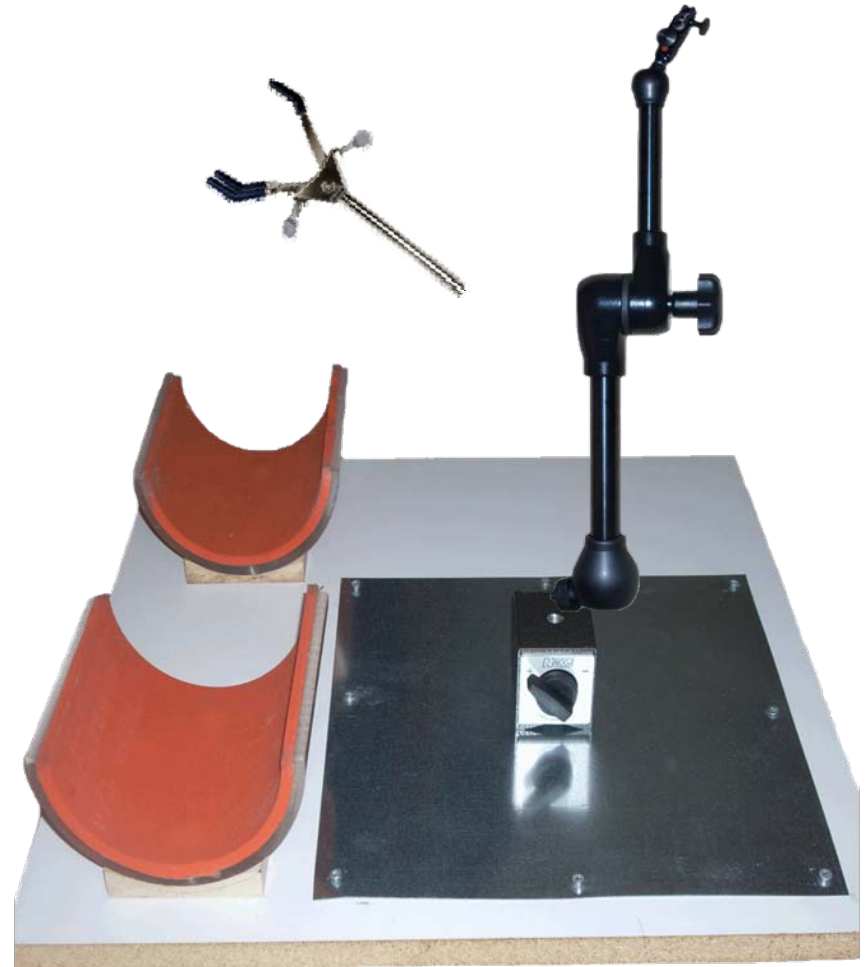


Background

- Problem:
 - Design a device to hold, position, and stabilize an ultrasound probe to be held against the arm in vascular reactivity studies
- Why is there a need?
 - Stabilization increases image quality
 - Frees up sonographer for other tasks/monitoring
 - Wrist deviated in one position for 5+ min.
 - Many clinics limit studies to 1/hour due to strain

Previous Work

- Constructed a platform
 - 2 arm cradles
 - Metal plate
- Large articulated arm
 - 2 ball/socket joints
 - 1 mass-adjusting knob
- 3 pronged clamp to hold probe transducer



Client Feedback

- Pros

- Probe holder with arm rest
- Steel plate and magnetic base combination

- Cons

- Difficult to operate
- Heavy
- Need washable arm rest cushion
- Bulky shape

Three Design Concepts

- Gooseneck
 - Replace articulated arm
- Articulated Arm
 - Similar to previous design
- Hybrid
 - Arm and Gooseneck combination

Design Matrix

	Score	Arm	Gooseneck	Hybrid
Cost	5	5	5	5
Weight	10	6	7	5
Gross Adjustment	25	22	17	20
Fine-tune Adjustment	30	15	28	28
Range	20	20	4	20
Rigidity	10	10	8	8
Total	100	78	69	86

2nd Generation Prototype

- Added gooseneck to articulated arm
- New probe clamping mechanism
- Resized cradle
- Aesthetic improvements
 - painted

Gooseneck

- Lighter than articulated arm
- Easier fine-tuning adjustments
- Greater range of motion



<http://www.denlorstools.com/shop/images/FO-W-72-641-300.jpg>

“Sandwich” Clamp and Cradle

- Switch from 3-prong to “sandwich”
- Easier handling and flexibility
- High edges of cradle cut down for additional comfort

Aesthetic Improvements

- Paint
 - Prevent rust
 - Aesthetically pleasing
- Vinyl Covering
 - Will cover foam arm cradle
 - Washable

Validation: Part 1

Usability and Clinical Integration

- Qualitative Testing – Based on user and patient feedback
 - Ease of use – Setup and Adjustment
 - Patient discomfort
- Test Plan:
 - Test Device in minimum of 4 studies, gather feedback from sonographer and/or patient



Validation: Part 1

Usability and Clinical Integration

- Quantitative Testing
 - Setup time – With vs. Without Holder
 - Holder will cause longer setup, but how much more?
- Test Plan
 - Measure setup time in minimum of 4 studies each



Validation: Part 2

Data Enhancement

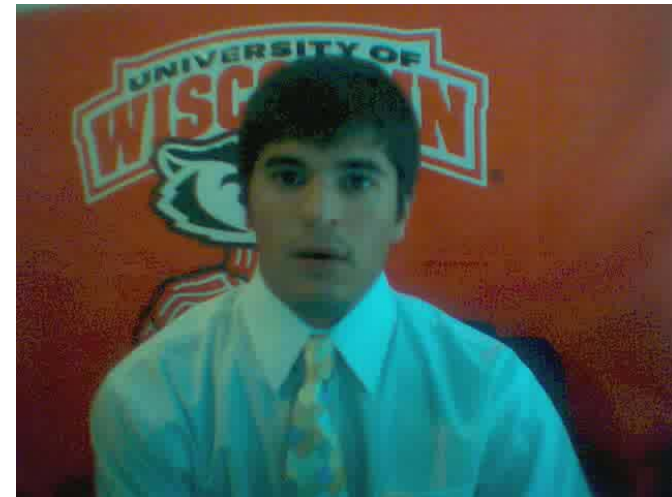
- Qualitative Testing
 - Ease of maintaining imaged region
 - Observed enhancement of ability to obtain image
 - Use of “zoom” feature on the ultrasound device
- Test Plan
 - Allow sonographers to use device for several weeks, gather feedback



Validation: Part 2

Data Enhancement

- Quantitative Testing
 - Noticeable change in image quality, ability to identify structures, diagnose conditions
- Test Plan
 - Provide clinicians with images obtained with and without the device
 - Score ability to characterize images obtained with and without device



Future Work

- Add vinyl covering to arm cradle
- Obtain Institutional Review Board (IRB) approval
- Collect and analyze data

Questions?