

# Project Design Specification—Ultrasound Probe Holder (Group 42)

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## Function:

A simple, stable, adjustable ultrasound probe holder to aid in the ultrasonography of arterial reactivity. The holder would stabilize the ultrasound probe to improve image quality and reduce motion artifact for better diagnostic effectiveness. The device should reduce strain on the sonographer by decreasing the amount of time the probe is handled.

## Client Requirements:

- Provides 6 degrees of positioning freedom
- Stable, no movement after being positioned
- Adjustable for small changes during study
- Cost efficient
- Ergonomic
- Cradle to stabilize patient arm
- Accommodate a variety of probe sizes

## Design Requirements:

- 1) Physical and Operational Characteristics
  - a) *Performance requirements* – Easily adjustable without interfering with the ultrasound procedure, able to make small adjustments quickly, securely holds the probe, stabilizes the patient's arm while in use, must hold the probe stable for 5 to 10 min periods. It should function with 6 degrees of freedom. The device should move the probe to any position between 20° to 120° from horizontal.
  - b) *Safety* – The materials should not be hazardous, and should not interfere with the ultrasound procedure.
  - c) *Accuracy and Reliability* – The device should be able to make small changes quickly and hold its position throughout the procedure. Once the positioning device is set, the probe should have a 30° range of heel/toe movement.
  - d) *Life in Service* – The device should last at least 5 years.
  - e) *Shelf Life* – The device should be able to be stored indefinitely without compromising its integrity.
  - f) *Operating Environment* – The probe holder will be used in typical laboratory and clinical settings.
  - g) *Ergonomics* – The device should be able to accommodate a large range of users (95<sup>th</sup> percentile male) without interfering with the ultrasound procedure.
  - h) *Size* – The platform of the device should be less than 3 feet long and 2 feet wide. The probe clamp should be small enough (12.7 by 10.2 cm) to fit into the sonographers hand once the probe has been secured.
  - i) *Weight* – The probe should be as lightweight as possible while providing a stable support. The device should be less than 30 kilograms
  - j) *Materials* – The materials should be cost efficient and should not interfere with the ultrasound procedure.
  - k) *Aesthetics* – The device should be aesthetically pleasing and blend in with the examination room.
- 2) Production Characteristics
  - a) *Quantity* – Only one product is currently needed, but it should be designed with the

intention of mass production.

b) *Target Product Cost* – The device should cost less than \$1000.

3) Miscellaneous

a) *Standards and Specifications* – Because this device is only for research purposes, there are currently no standards.

b) *Customer* – The device will be used by medical personnel in a laboratory or clinical setting.

c) *Patient related concerns* – The device should not harm the patient.

d) *Competition* – There are currently some ultrasound probe holders in use, but none are available commercially.