

Product Design Specifications- December 11, 2012
Electronic Bedside Device to Measure Jugular Venous Pressure

Team Members

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Problem Statement

A device is needed to measure the jugular venous pressure using sensors placed on the body to measure the patient's chest circumference, incline angle, and distance from the right atrium to the pulsation on the jugular vein. A digital feedback will display these measurements via a phone or computer monitor.

Client requirements

- Non-invasive device to more accurately measure JVP.
- Hands-free device for measurement display.
- Must calculate chest circumference, angle of incline, and distance from the right atrium to the pulsation on the jugular vein.

Design Requirements

1. Physical and Operational Characteristics

- a. *Performance requirements*: The device will be used daily at a clinic and must be able to withstand normal wear and tear. The feedback must be easily understandable by the user.
- b. *Safety*: The device must be able to be safely applied to the body and cause no harm to the patient.
- c. *Accuracy and Reliability*: The device needs to accurately determine the circumference within 1 cm for each different body type. The inclination angle needs to be determined accurately within 5 degrees. The distance from the top of the jugular pulsation to the right atrium needs to be within 1-2 cm for each measurement.
- d. *Life in Service*: The device must run up to 5 minutes daily for clinical patients for however long the administrator decides is necessary.
- e. *Shelf Life*: The device will be stored inside in a hospital or clinic environment.
- f. *Operating Environment*: The typical environment for this product will be in a clinic or hospital. The device will be stored until needed where upon use by only certified administrators.
- g. *Ergonomics*: The device must be able to accommodate all genders, ages, body shapes and sizes.
- h. *Size*: This device must be able to fit reasonably on a clinic or hospital shelf. Ideally, this product should be able to fit in the palm of the hand.
- i. *Weight*: For portability reasons, this device should be no more than 5 lbs.
- j. *Materials*: The device will include sensors, wiring, arduino, MATLAB program and a visual display on a computer.

k. *Aesthetics, Appearance, and Finish*: The display will be easy to read and interpret. The device does not need to have a specific color, shape, form or texture but it does need to look professional.

2. Production Characteristics

a. *Quantity*: The client only needs one sample device but possibly more for future use in clinics and hospitals.

b. *Target Product Cost*: The target cost of this product is under \$500.

3. Miscellaneous

a. *Standards and Specifications*: For this device to be used in clinics and hospitals, patient consent will be necessary before the pressure is measured.

b. *Customer*: The customer must feel comfortable during the procedure. It is important to withhold patient dignity and ensure that there are no negative side effects.

c. *Patient-related concerns*: The data should be protected under the patient-doctor confidentiality agreement. Standard cleaning techniques may be necessary after each use to ensure sterile products. The device must be comfortable and easily administered.

d. *Competition*: There is a very basic device to measure the jugular venous pressure but is very inaccurate because it is a standard measurement for each patient. The method is unreliable because each doctor performs the measurements slightly different.