Product Design Specifications

Sensory Mapping

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Advisor: Prof. Nimunkar

Client: Dr. Miroslav Backonja

Function:

Our client, Dr. Miroslav Backonja, has asked us to help develop a system for calculating the surface area for mapping of sensory abnormalities. Currently, doctors manually trace sensory abnormalities on graph paper, and measure the area by counting squares inside the traced area. We would like to develop a system that would allow quantitative and accurate measurement of the abnormal area for everyday use as well as clinical study applications. Ideally, the system would accurately calculate the surface area of a 3D surface, but a first step in the process would be to develop a system that accurately calculates the area of a traced shape on a 2D surface.

Client Requirements:

- The final product should be noninvasive
- Must be user friendly
- Must be compatible with different samples without modification
- Must calculate surface areas within ten percent repeatability between trials (10% precision)
- Must yield accurate data (10% accuracy)
- Must take less time to use than the current square counting system
- Must not harm patient or medical personnel

1. Physical and Operational Characteristics

a.) Performance Requirements: The system should measure surface areas more efficiently than the current system.

b.) Safety Requirements: The final design should not come in significant contact to the patient. Some patients experience hypersensitivity, or open wounds that require the least amount of contact possible. Any type of area or perimeter marker used must not harm the patient in any way, and should be able to be easily removed.

c.) Accuracy and Reliability: The accuracy of this system should be within 10% of the actual known area for a given surface. The precision should also be within 10% between measurements.

d.) Life in Service: If the final design is a computer program, it should last as long as technology permits.

e.) Shelf Life: Long periods of inactivity should have no effect on the performance the system.

f.) Operating Environment: The device will function in a clinical environment. This suggests it will not encounter extreme temperatures or humidity. There should be no significant problems due to environmental conditions.

g.) Ergonomics: The device should be easy to use for any physician with minimal programming background. It will be user friendly such that someone that is familiar with a digital camera and uploading pictures could use it.

h.) Size: The device will be used in an exam room, so for this reason the entire system should be easy to transport and store in a cupboard or office.

i.) Weight: The entire system should be easy to handle by one person.

j.) Materials: Any materials are welcome, provided they are safe for use in a hospital exam room.

k.) Aesthetics: Aesthetics should not affect any aspect of our design as our client prefers function over appearance.

2. Production Characteristics

a.) Quantity: One complete prototype will be fabricated.

b.) Target Cost: Firm guidelines for cost have yet to be established, but we expect the budget to be around $200.00.