

Product Design Specifications: Computer Input Device

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Team Roles:

Team Leader: Steve Welch

Communications: Andrew Bertram

BWIG: Matt Parlato

BSAC: Joe Decker

Function: The device must assist the client in accessing his personal computer. He is currently using a modified trackball mouse, but this device is difficult for him to use and requires a large amount of time to set up each day. Our goal will be to design a device that not only replaces the current “trackball-setup” but one that can also be setup quickly and efficiently. An arm support system will also be designed to hold the client’s arms in a position that will allow him to easily access his computer input device.

Client Requirements:

- Input device must allow him to have full access to his computer with minimal physical movement
- Arm supports must be very stable
- Input device must require less continuous adjustments than current trackball-setup
- Input device and arm supports must be able to handle continuous use of at least eight hours per day

Design Requirements:

- Input device and arm supports cannot irritate the client’s skin
- Both the arm supports and the input device must be easy to setup and take down on a daily basis
- Input device must require little technical expertise to setup each day (preferably, it would plug into his computer’s USB port)
- Device must not require an extensive amount of effort from the client

1. Physical and Operational Characteristics

- a. **Performance Requirements:** The input device must allow the client full access to his computer for at least eight hours each day. It must allow require minimal physical movement on his part. The arm supports must be able to comfortably support his arms for at least eight hours each day. Neither of these devices can allow the client’s arms and hands to slip into a position from which he cannot access his computer. Finally, both the arm supports and the input device must function well on a regular basis without requiring frequent adjustments throughout the day.

- b. Safety:** The primary safety concern with the input device and arm supports is that they cannot irritate the client's skin. For instance, a surface as smooth as that of finished wood or smooth plastic would be far too rough for the client's skin. Also, the client lacks significant feeling in his skin, so he would be unable to tell if his skin is being damaged. Therefore, extra care must be taken to ensure that all surfaces he touches are extremely soft/forgiving and will not damage his skin in any way.

- c. Accuracy and Reliability:** The device should be precise enough to move the cursor exactly where the client desires with extreme sensitivity. The range of motion is only up to three centimeters, so extreme reliability is needed.

- d. Shelf Life:** The device will be used and stored in a standard apartment home. It must have a shelf life of about the average computer mouse.

- e. Operating Environment:** As stated in part d, this device will be used in a standard apartment home. These are ideal conditions with room temperature ranges. Dust may be a concern, as it might enter the device and cause malfunction.

- f. Ergonomics:** The arm support device must have adjustable height. The wrist should be adjustable from zero to six inches above the table; the arm should be able to adjust laterally. The client's fingers can move in circular motion, approximately three centimeters in diameter.

- h. Size:** The mouse interface must fit into the client's hand, and the arm support must fit on his computer desk

- i. Weight:** Interface should not have excessive weight where the client can't hold it up for 8 hours

- j. Materials:** All materials that come in contact with the client's skin must be soft enough to not cause damage. All other materials must be durable enough to sustain general wear from use

- k. Aesthetics, Appearance, and Finish:** Appearance and aesthetics are not of main concern, and finish should be fit for comfortable use

2. Product Characteristics

- a. Quantity:** One unit will be needed.

- b. **Production Cost:** The budget is \$200. Since one unit is needed, no production cost limit other than the budget is required.

3. Miscellaneous

- a. **Standards and Specifications:** Our device must meet or exceed the efficiency of the current computer input device. Our device must also meet or exceed the speed of set-up time of the current device.
- b. **Customer:** The user of our computer input device is an individual with muscular dystrophy. Other individuals with limited arm, hand, and finger movement could also use our device.
- c. **Competition:** Our competition is the current device, which consists of a mouse with a large trackball, foam attached to the mouse buttons, and towels as arm supports. Other competition for computer input devices for people with disabilities includes speech recognition computing and optical devices (head movement moves cursor, eye blinks click the mouse).