The “Fit Sit”: An Ergonomic Chair that Improves Posture

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2016 SIMR Bioengineering Bootcamp, Stanford University

Introduction

More than 26 million Americans between the ages of 20 and 64 experience back pain.1 A major cause of this back pain is that we spend 30% of our lives sitting.2 In addition to causing muscular pain, maintaining poor posture for extended periods of time has long-term health consequences; it can lower life-span, impede breathing, and increase the risk of cardiovascular disease. By improving poor posture, we can alleviate and even prevent back pain and other posture-related ailments. Ergonomic chairs on the market tend to be extremely expensive, so we sought to create a chair of superior quality but of lower cost. Our chair works to strengthen the user’s muscles through its built-in exercise equipment, and even reminds the user to correct posture or to take breaks via a vibrating motor. The chair encourages the user to engage many muscle groups while seated, which helps develop better sitting and standing postures.

Need Statement

A way to improve sitting in those with poor posture to create correct positioning and reduce muscular pain at a low cost.

Need Specifications

Must Haves:
- Comfortable
- Correct Back Placement (Posture)
- Relatively Low Cost
- Adjustable

Nice to Have:
- Elbow Placement
- Heating/Cooling Capabilities
- Appearance/Style
- Easy to Maneuver
- Exercise Capabilities

Competitor Analysis

Herman Miller Aeron
$729.00
The curved back, in conjunction with the adjustable lumbar support piece, alleviates lower back pain.

Herman Miller Embody
$1229.00
We realized that the narrow back is important for sitting up straight.

Concept Analysis

We generated three different concepts to choose from:

A: Massage Chair
- Massage capabilities for the back and neck
- Heating and cooling capabilities
- Neck and arm exercises
- Forward-tilting seat to encourage the engagement of the user's own muscles

B: Energizer Chair
- Focused heating and cooling capabilities
- Lumbar support

C: Multiple Sclerosis Chair

We used a concept scoring matrix to decide that our project would be mainly based on the energizer chair.

Prototype

Headrest:
The main function of the headrest is to provide an exercise for the user’s neck. Strengthening the neck muscles consistently will improve posture over time.

Armrests:
The armrests are flat so that the user’s arms are parallel with the ground. Elastic cords attached to the top of the armrests allow the user to exercise his shoulder, arm, and back muscles.

Wheels:
These wheels were taken from an old chair. The wheels need to be light and allow the chair to be easy to maneuver.

Seat:
The seat’s shape curves with the user’s legs and tapers at the front. This shape encourages the user to sit up straight with his feet flat on the ground, which promotes good posture. The vibrating motor reminds the user to utilize an exercise mechanism or simply adjust his posture.

Conclusions

The “Fit Sit” allows people to affordably integrate proper posture development while sitting. Our chair’s back uses only empty space and mesh to mold to the user’s back, while more complicated designs on the market are material-intensive. Therefore, our chair costs significantly less. An improved version of our chair would have many small vibrating motors on the seat rather than the single, bulky motor on our prototype. Rather than using a 3D printer, we would use plastic molds in order to ensure structural integrity. In conclusion, our chair is affordable, has built-in exercise capabilities, and helps the user improve their posture.

References


Acknowledgments

Thanks to Dr. Serena Hu and Kathleen Tam, whose expertise influenced our design. Thanks to the Product Realization Lab TAs, our mentors—Derek Croote, Ben Kotopka, Arjun Adlham, Colleen Rhodea, and Alec Tarashansky, and our advisors—Mandy Li, Elaine Ng, Heather Rogan, and Alex Wnorowski—who answered all our questions with useful, detailed advice that aided us greatly throughout the engineering process. Thank you to the Argen Foundation for supporting the SIMR program.