Improve Posture

Challenge Problems and Resources

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1. CHALLENGE PROBLEM: IMPROVE POSTURE

Back and neck pain are global problems, and are the leading cause of lost worker productivity (Horton, 2012). This is not only costing the US hundreds of billions of dollars in health-care costs (Kaplan et al., 2013), but also decreases worker productivity (Hartvigsen, 2001) and quality of life for many. Although some back problems are congenital, and others due to accidents, the vast majority are due to occupation, lifestyle, and lack of health education and understanding of the importance of posture (American Chiropractic Association, 2014).

There is no common solution to back and neck pain, primarily due to the many types and locations of pain. However, much of the healthcare costs and lost time in productivity can be mitigated by improving posture while standing, sitting, lying down and even when relaxing and engaging in our choice of sedentary hobbies. The challenge is to develop a model of a physical product that can help improve posture. The model may include a piece of furniture, a retrofit for a common piece of furniture, an orthotic, or other device that could be used to help correct posture in the sitting, standing, or lying down position.

Research a common back/neck problem which affects a particular population (other than congenital ones such as scoliosis or others due to traumatic injury). The population can be large or small, but target one that has a common focus due to occupational or lifestyle choice, (i.e., a group of people that suffers from a similar problem). Identify the possible causes of this problem first, use any of the suggested software to help develop a product or app, and if possible, 3D print that product for field testing.

1.1. THE TOOLS

This challenge problem focuses on researching and identifying a problem in a particular population and then designing a solution that addresses that problem. Because the solutions are varied, possible tools could include 3D modeling software such as SketchUp or SolidWorks, 3D scanning technologies, 3D printing technologies, 3D shoe design software such as Delcam, surveys and questionnaires, and mobile app development kits.

1.2. THE CHALLENGE

Model and/or print a customized device that will improve the posture of a particular population. In addition, you could develop an app that could provide customized information or reminders in a timely manner to a person to help improve posture.

2. EXTENSION #1

Identify a person (or persons) with poor posture due to lack of understanding and/or occupational situation (office worker, professional driver, etc). Research the causes of their poor posture, and identify possible products that may assist them in improving their posture (other than pharmaceuticals, implants or reconstructive surgeries). Develop a model of the product, and product test it.

3. EXTENSION #2

After testing your prototype and going through the entire engineering design process, find out if there is a real market for your product. Research if there are other products available and if you truly have an innovative design that could meet your population's needs. Investigate and develop the potential for crowd sourcing to bring your product to market. You can potentially use Quirky.com to see if your product will have support.

4. RESOURCES

4.1. ARTICLES

- The Effect of the Forward Head Posture on Postural Balance in Long Time Computer Based Worker
- Hyperkyphotic Posture Predicts Mortality in Older Community-Dwelling Men and Women: a Prospective Study
- The Rehabilitation of Hyperkyphotic Posture in the Elderly
- Posture to Straighten Your Back
- Office Chair: How to Reduce Back Pain
- Sitting Biomechanics Part 1: Reivew of the Literature

4.2. INTERACTIVE RESOURCES

- ChiroMatrix
- Lumbar Anatomy
- Balance Center
- Autodesk Fusion 360
- Autodesk Fusion Tutorial
- Delcam Shoemaker Software
- Delcam Tutorial