

Preventing Weightlifting Injuries by Barbell Modifications

September 16 - September 20, 2024

Client: Mr. Robert Gold

Advisor: Prof. William Murphy

Team Members:

Jackson Jarrett jrjarrett2@wisc.edu (Leader and BWIG)

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Luke Schmeling lascmeling@wisc.edu (BSAC)

Problem Statement

Over one million weightlifters experience serious injuries every year. These injuries are often caused by an uneven distribution of load on the barbell, leading to the weight lifter favoring one arm over the other. The team has been tasked with designing a biomedical device that can diagnose this strain on the body in coordination with specific muscles in use.

Brief Status Update

The team met on Monday to discuss broad project ideas, divide research, and divvy parts to complete the Product Design Specifications document. This document will be dynamic, and we will continue to update and specify requirements both quantitatively and qualitatively. We look forward to continuing research, and begin brainstorming design ideas in the coming week.

Team Goals

- Continue to research and add to the PDS in terms of quantitative specifics
- Meet with our advisor to discuss the PDS and next steps for brainstorming design ideas
- Contact the client with follow up questions for clarity
- Begin brainstorming design ideas for the upcoming design matrix

Individual Accomplishments and Goals

Jackson: This week I created the PDS shell document and completed my section of the PDS document, as well as sharing the progress report and finishing my weekly report. I continued my preliminary research with common weightlifting injuries, and in the coming weeks I look forward to expanding on this research. I will work with the team to coordinate a meeting time as we will work to create our first preliminary designs for the design matrix.

Kai: Worked on the PDS report with the team. Found MATLAB code for the motion software to make quantitative observations of very small muscular movements. Researched types of cameras to use with the software. Since our device is considered “Low Risk” by FDA regulations we have a lot of options for our design and don’t need premarket approval or meet section 510(k) standards. Using EMG technology does change the classification to a class II device, but the regulations and premarket approval status stay the

same. I plan on researching methods of combining technologies and speaking with experts in biomechanics and computer science to determine the ease of fabrication and feasibility of using EMG tech in unison with the sensors.

Luke: Worked on standards and specifications for PDS report. Did research on EMG application to studies regarding muscle activation and what would be some of the major muscle groups being used in an activity similar to back squat (deadlift). For the upcoming week I plan to do research with Kai on the cameras used for the software we might possibly use to look at muscle activation.

Gavin: I worked on the physical and operation section of the PDS. I also did some research on how the path of a barbell on benchpress affects what muscles are more active, and what muscles are more at risk of injury. In the upcoming week I will continue on my research and focus more on ways to track the barbell or other ways to look at muscle activation and risk of injury.

Design Accomplishments

None

Weekly/Ongoing Difficulties:

None

Project Timeline:

Week #	Task
1	Choose project Assign roles
2	Finish first progress report BSAC meeting First client meeting
3	PDS, Brainstorm, Research
4	Brainstorm, Literature Search, Design matrix criteria and design ideas (at least three) due
5	Preliminary Oral Presentation
6	Preliminary Report, Electronic Notebook, Peer/Self Evaluation, Decide on final design
7	Final Design
8	Order materials, consider submitting invention disclosure

9	Fabrication, show and tell
10	Fabrication
11	Fabrication
12	Design Testing and Modification, Poster Draft Review
13	Design Testing and Modification, Final Report
14	Poster Presentation, Final Report, Final Electronic Notebook, Team Evaluation, Peer/Self Evaluation

Expenses [+](#) BPAG Expense Spreadsheet