Preventing Weightlifting Injuries by Barbell Modifications

November 11th- November 15th, 2024

Client: Mr. Robert Gold
Advisor: Prof. William Murphy

Team Members:
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Problem Statement

Thousands of weightlifting injuries occur every year 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 prevent weight lifting injuries by targeting, identifying, and correcting improper form.

Brief Status Update

The team has made considerable progress with coding, as well as completed the soldering of our arduino connection. The 3D printing final fabrication is complete, as we look forward to testing in the coming week.

Team Goals

We want to complete testing protocols and testing in the coming week, as well as fastening of the technology to the weightlifting clip via screws.

Individual Accomplishments and Goals

Jackson: This week, I began by outlining the rest of the schedule for the group. I highlighted due dates, important dates, and goals for fabrication, testing, and working on our final poster. I began testing protocols, and in the next week we look forward to meeting as a team to finalize and perform these tests. Kai and I met with our biomechanics TA on Thursday afternoon, where we were able to gain some valuable information regarding the transformation of point data into MATLAB. I look forward to beginning testing, finalizing fabrication, and beginning final deliverables work.

Kai: This week I spent a lot of time fine tuning the Arduino and Matlab coding and was able to achieve successful transfer of data between the two with the ability to record data without the IMU being directly connected to a serial monitor. The only issue now is that the IMU, being on the cheaper side, experiences a lot of noise and will not graph very accurately even with strong filters in the matlab code and with calibrating the sensor in arduino first. I want to perform testing this weekend, but the graphing needs to

perform correctly or else testing will be nearly impossible to achieve anything valuable. This will be my focus for the next few days with the goal being to get testing data this weekend or by next weekend.

Luke: This week I began some drafts for the testing plans outlining what aspects we want to test as well as how we are going to measure these criteria in a way that minimizes the need for qualitative description. This upcoming week I look forward to finalizing testing plans with the team and beginning to test and improve our design.

Gavin: This week I picked up the newest 3-D printed box which worked great and we are proceeding to test using it. I also started working on our testing protocols which we will perform in the next week. I also started to assemble some of the parts and attached the command strips to our components. Next week we will finish assembling by attaching everything to the clip and soldering the battery pack onto the Arduino. We will also start working on our final deliverables in the upcoming weeks.

Design Accomplishments

The 3D fabricated components are complete and ready for testing. We have a coordinate system shown on Arduino and MATLAB, and look forward to gathering test data in order to have a basis of comparison.

Weekly/Ongoing Difficulties:

N/A

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**