

# Preventing Weightlifting Injuries by Barbell Modifications

October 28st- November 1st, 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 progress with the coding of the Arduino and MPU-6050, and is currently working on graphing on MATLAB. We have fabricated a test casing for the technology via 3D print, and have begun the 3D printing of the final technology housing.

## Team Goals

Examine test casing for technology, and make necessary adjustments for the actual final design. Continue coding and working on MATLAB, as well as outline testing.

## Individual Accomplishments and Goals

Jackson: This week I continued to research and work on the transfer of Arduino coordinates into MATLAB. I outlined a meeting time where as a team we would discuss the answers provided for us by our advisor, as well as what we were looking to achieve with the Show & Tell this upcoming Friday. We will discuss testing procedures, and in the next weeks we look forward to beginning testing on our product in preparation for final deliverables.

Kai: This week I met with the team and met to continue our fabrication process, continued editing the code for the data transfer to MATLAB, and discussed what the necessary materials were for show and tell tomorrow. In the coming week, the team hopes to finish our first prototype, get beneficial feedback from other teams during show and tell, and modify our prototype as needed.

Luke: This week I struggled my way through Solidworks content. After consultation with Gavin by simply looking at the ease with which he could use onshape, I decided this is probably a much more viable option for us and our 3D printing needs. I also brought up two good points to the group one of

which was a tweak to our design idea which included two boxes on two joints of the clip as opposed to one very large box, as well as the consideration that we should keep in mind that we should bias the compartments away from the weight so the important breadboards are not bearing the load of the bar. This upcoming week I plan to start drafting our testing and put the plans in the PDS.

Gavin: This week collected the 2nd test print for the sliding lid, the print wasn't very good because the printer messed it up, but the measurements and specs that it was printed with worked. I designed the full box on onshape with the help of Luke. I then printed the box with the 3D printers. As a group, we also prepared for our Show & Tell. In the upcoming week I hope to do some tests with our box, and attach it to the clips.

**Design Accomplishments**

Test model for technology casing. The weightlifting clips have arrived. We have calibrated the MPU-6050 to show coordinates on Arduino. We have made beginning progress on MATLAB coordination.

**Weekly/Ongoing Difficulties:**

N/A

**Project Timeline:**

| <b>Week #</b> | <b>Task</b>  |
|---------------|--|
| <b>1</b>      | <b>Choose project<br/>Assign roles</b>   |
| <b>2</b>      | <b>Finish first progress report<br/>BSAC meeting<br/>First client meeting</b>                          |
| <b>3</b>      | <b>PDS, Brainstorm, Research</b>   |
| <b>4</b>      | <b>Brainstorm, Literature Search, Design matrix<br/>criteria and design ideas (at least three) due</b> |
| <b>5</b>      | <b>Preliminary Oral Presentation</b>   |
| <b>6</b>      | <b>Preliminary Report, Electronic Notebook,<br/>Peer/Self Evaluation, Decide on final design</b>       |
| <b>7</b>      | <b>Final Design</b>  |
| <b>8</b>      | <b>Order materials, consider submitting invention<br/>disclosure</b>                                   |
| <b>9</b>      | <b>Fabrication, show and tell</b>  |
| <b>10</b>     | <b>Fabrication</b>   |

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|-----------|--|
| <b>11</b> | <b>Fabrication</b>   |
| <b>12</b> | <b>Design Testing and Modification, Poster Draft Review</b>  |
| <b>13</b> | <b>Design Testing and Modification, Final Report</b>   |
| <b>14</b> | <b>Poster Presentation, Final Report, Final Electronic Notebook, Team Evaluation, Peer/Self Evaluation</b> |

Expenses [+](#) BPAG Expense Spreadsheet