

Asymmetrical Force Sensor for Rowing Biomechanics

Date: 9/12/2024

Client: Jill Thein-Nissenbaum, Tricia DeSouza

Advisor: David Appleyard

Team:

Team Leader: Alicia Moeller (aamoeller@wisc.edu)

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Problem statement

Many college rowing athletes, particularly women, are susceptible to lifelong lower back or hip injuries due to disparate weight distributions on each leg while rowing. This issue can be addressed through gathering real-time data on athlete biomechanics, but this data is often difficult to obtain. Collection and analysis of biomechanical data will enable athletes to adapt their technique towards better performance, and will assist coaches and trainers in preventing injury. The client, Dr. Jill Thein-Nissenbaum, has tasked the team with creating a force plate system that can collect biomechanical data from rowers' lower extremities. The team's goal is to create a wireless sensor system in the rowboat that will capture load distribution during time of use and will assess lower extremity asymmetry to establish risk stratification. Additionally, the team aims to translate the force plate system into a user-friendly interface that will enable coaches and athletes to understand essential biofeedback information, thereby improving both performance and safeguarding against potential injuries.

Brief status update

The team met this week to begin defining the scope of the project and goals we would like to accomplish this semester. To begin with, the team would like to revisit the load cell design by meeting with Dr. Gruben to get his expertise on the subject. In addition, the team outlined some

design requirements for this semester's prototype, including that the footplate remain stationary and that there should be no seat or height adjustments required for the rower.

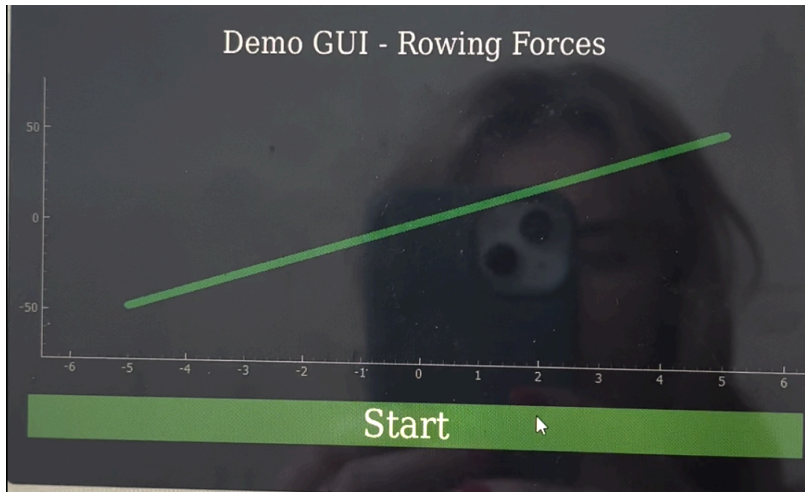
Difficulties / advice requests

None this week.

Current design

Final design from last semester:





Materials and expenses - None yet

Item	Description	Manufacturer	Mft Pt#	Vendor	Vendor Cat#	Date	#	Cost Each	Total	Link
Category 1										
									\$0.00	
									\$0.00	
Category 2										
									\$0.00	
									\$0.00	
								TOTAL:	\$0.00	

Team goals for the next week

1. Meet with the clients to set clear goals/expectations for the product.
2. Meet with Dr. Gruben to discuss load cell design ideas and feasibility
3. Finalize this semester's PDS

Next week's individual goals

- Neha
 - Research potential designs other than load cells, including sensor insoles
 - Work on PDS with team
 - Create preliminary GUI designs and rower feedback survey to evaluate them
- Simmi
 - Set up a meeting with Dr. Gruben about ways to cancel tangential forces
 - Research design ideas

- Alicia
 - Research load cell options.
 - Consult Dr. Gruben about load cell enclosures.
- Emily
 - Research insole pressure sensors
 - Brainstorm design ideas
- Colin
 - Research load cells and “Wii Fit Board” Concept.

Timeline

Task	Sep				Oct				Nov				Dec	
	6	13	20	27	4	11	18	25	1	8	15	22	29	6
Project R&D														
Empathize	X	X												
Background	X	X												
Prototyping														
Testings														
Deliverables														
Progress Reports														
Prelim presentation														
Final Poster														
Meetings														
Client														
Advisor														
Website														
Update														

Filled boxes = projected timeline

X = task was worked on or completed

Previous week's goals and accomplishments

- Neha:
 - Met with the group and decided team roles.
- Alicia:
 - Met with the group to set clear goals for the semester.
 - Researched off-axis loading with load cells.
- Emily:
 - Met with advisor and team to discuss overview of semester
- Colin:
 - Met with group to set semester goals and end of year goals.
- Simmi:

- Met with group members to prepare for advisor meeting and set goals for the semester
- Reached out to clients to set a meeting date for the semester
- Team previous goal:
 - Map out project goals

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Team	9/9	Group Meeting	1	1	1
Allicia	9/12	Load cell research	1	2	2
Neha	9/08	Sensor insole research	1	2	2