Rowing biomechanics for lower extremities

Date: 2/1/2023

Client: Jill Thein-Nissenbaum, Tricia DeSouza
Advisor: Dr. John Puccinelli
Team:

Team Leader: Neha Kulkarni (nnkulkarni@wisc.edu)

Communicator: Simerjot Kaur (kaur26@wisc.edu)

BWIG: Emily Wadzinski (ewadzinski@wisc.edu)

BSAC: Allicia Moeller (aamoeller@wisc.edu)

BPAG: Colin Fessenden (ckfessenden@wisc.edu)

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

This week the team was focused on getting new team members oriented with the project and setting goals for the semester. The team has identified the three main components of the design (force transducer circuit, display, and footplate) and will be dividing into sub-teams focusing on

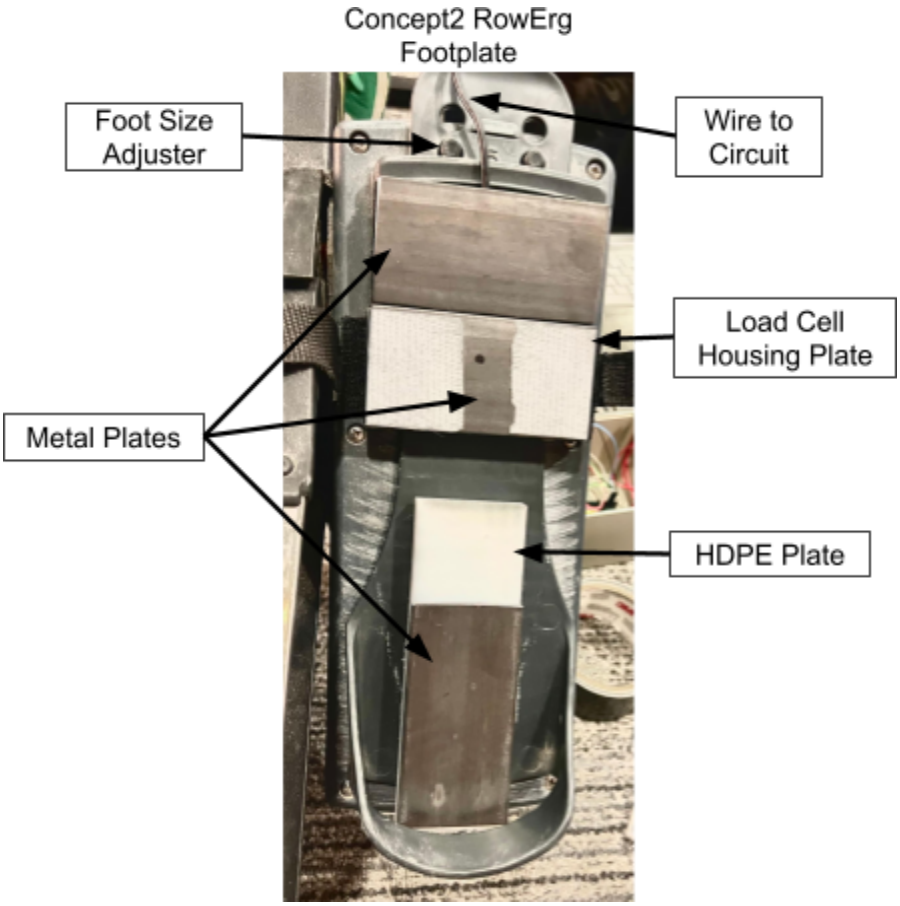
one component. In addition, the team will be visiting the UW Porter Boathouse on Friday to meet with the client and see the facilities again.

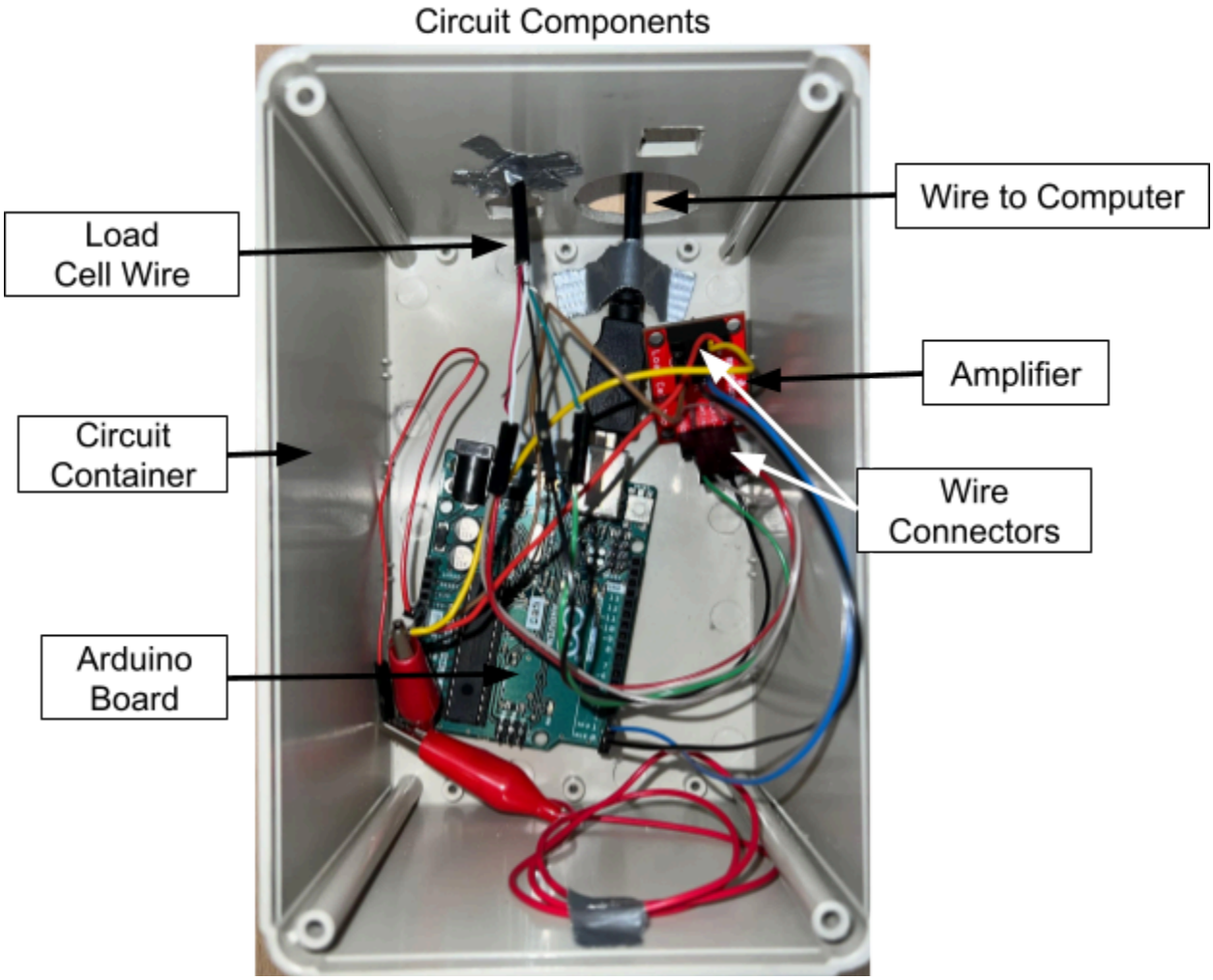
Difficulties / advice requests

The team is currently having difficulties deciding which circuit configuration best suits the PDS. This decision must be made efficiently in order to research and obtain materials.

Current design

Final design from last semester:





Materials and expenses - None yet

Item	Description	Manufac-turer	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**	

Major team goals for the next week

1. Meet with Jill and Tricia at the boat house and discuss project scope for this semester.
2. Build out a project schedule for the semester and divide up aspects of the project.
3. Decide what kind of force transducer we want to use for the next iteration of the force plate.

Next week's individual goals

- Neha
  - Research strain gauge circuit configurations
  - Look into societal impacts and ethical concerns of the project
- Simmi
  - Research more about hooking Arduino up with Python/MATLAB
  - Start coming up with preliminary designs
- Allicia
  - Research load cell circuit designs
  - Research LCD displays - check ECB storage rooms
- Emily
  - Research displays and force plate monitoring systems
  - Look into coding alternatives compared to Arduino
- Colin
  - Look into ergonomic ways to design new footplate to house the force sensor and fit over the existing footplate.

Timeline

Task	Jan	Feb				March					April				May	
	26	2	9	16	23	1	8	15	22	29	5	12	19	26	3	10
Project R&D																
Empathize	X	X														
Background…	X	X														
Prototyping																
Testings																
Deliverables																
Progress Reports		x														
Prelim presentation																
Final Poster																
Meetings																
Client		x														
Advisor		x														
Website																
Update																

Filled boxes = projected timeline
X = task was worked on or completed

Previous week's goals and accomplishments

- Neha: Preliminary research on circuit components needed
    - I researched foil strain gauges and different configurations for them, like the Wheatstone Bridge.
- Allicia: Do preliminary research on lower back pain in rowers.
    - I researched the occurrence of lower back pain in rowers, as well as testing set-ups of previous instrumentation erg research studies.
- Emily: Conduct the literature search considering the outcomes listed in lecture
    - I found research comparing the differences in men's and women's resulting ground reaction forces, in which they concluded there was not a large significance.
- Colin: Preliminary research on societal/cultural differences between male and female rowers
    - I found research on key factors of women that could contribute to the background of the injuries.
- Simmi: Research data storage and analysis methods.
    - I found a tutorial on how to hook up Arduino with Python, which seems doable for the project.
- Team previous goal: Discuss with group members design plans moving forward
    - Met as a group on Wednesday and with advisor on Thursday to help flesh out plans
    - Are meeting with client Friday to hear from them

Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Allicia	2/1/2024	Preliminary research	5	5	5
Neha	2/1/2024	Preliminary research	5	5	5
Colin	2/1/2024	Preliminary research	5	5	5
Simmi	2/1/2024	Preliminary research	5	5	5
Emily	2/1/2024	Preliminary research	5	5	5