

# Rowing biomechanics for lower extremities

Date: 2/15/2023

Client: Jill Thein-Nissenbaum, Tricia DeSouza

Advisor: Dr. John Puccinelli

Team:

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

Communicator: Simerjot Kaur ([kaur26@wisc.edu](mailto:kaur26@wisc.edu))

BWIG: Emily Wadzinski ([ewadzinski@wisc.edu](mailto:ewadzinski@wisc.edu))

BSAC: Allicia Moeller ([aamoeller@wisc.edu](mailto:aamoeller@wisc.edu))

BPAG: Colin Fessenden ([ckfessenden@wisc.edu](mailto: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 researching and brainstorming preliminary designs for both the footplate and the display. A design matrix was made for the footplate and another matrix was made for the display. The team is seriously considering pivoting from an Arduino

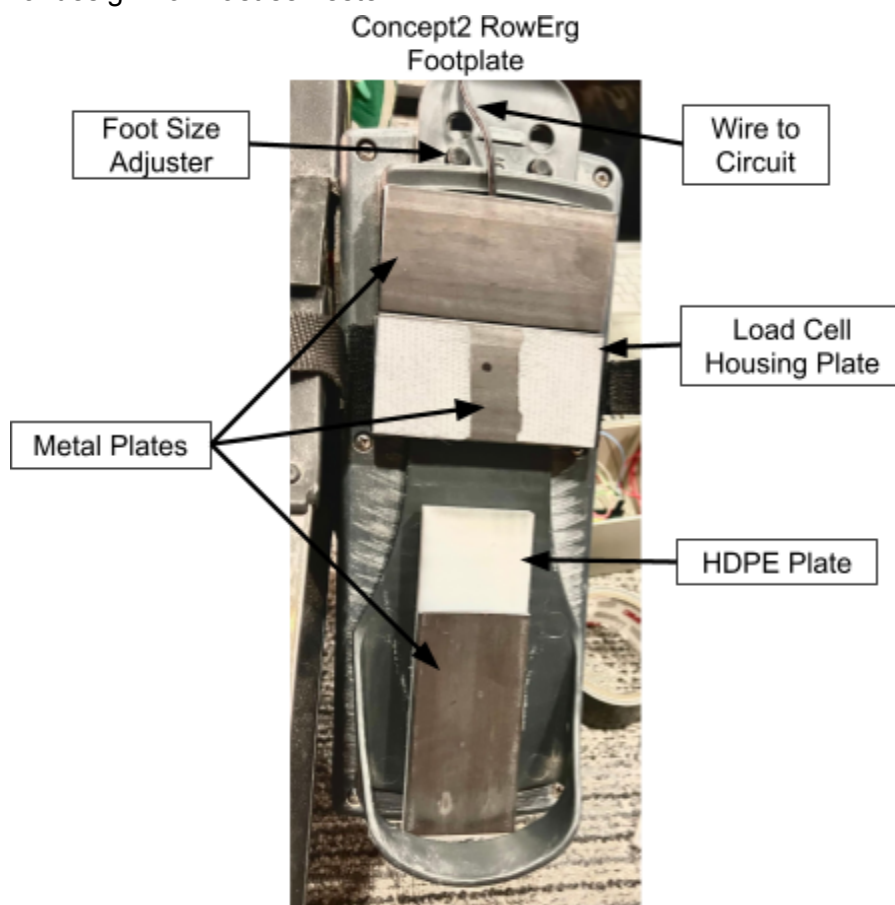
microcontroller to a Raspberry Pi due to its better display capabilities and complex programming capabilities.

## Difficulties / advice requests

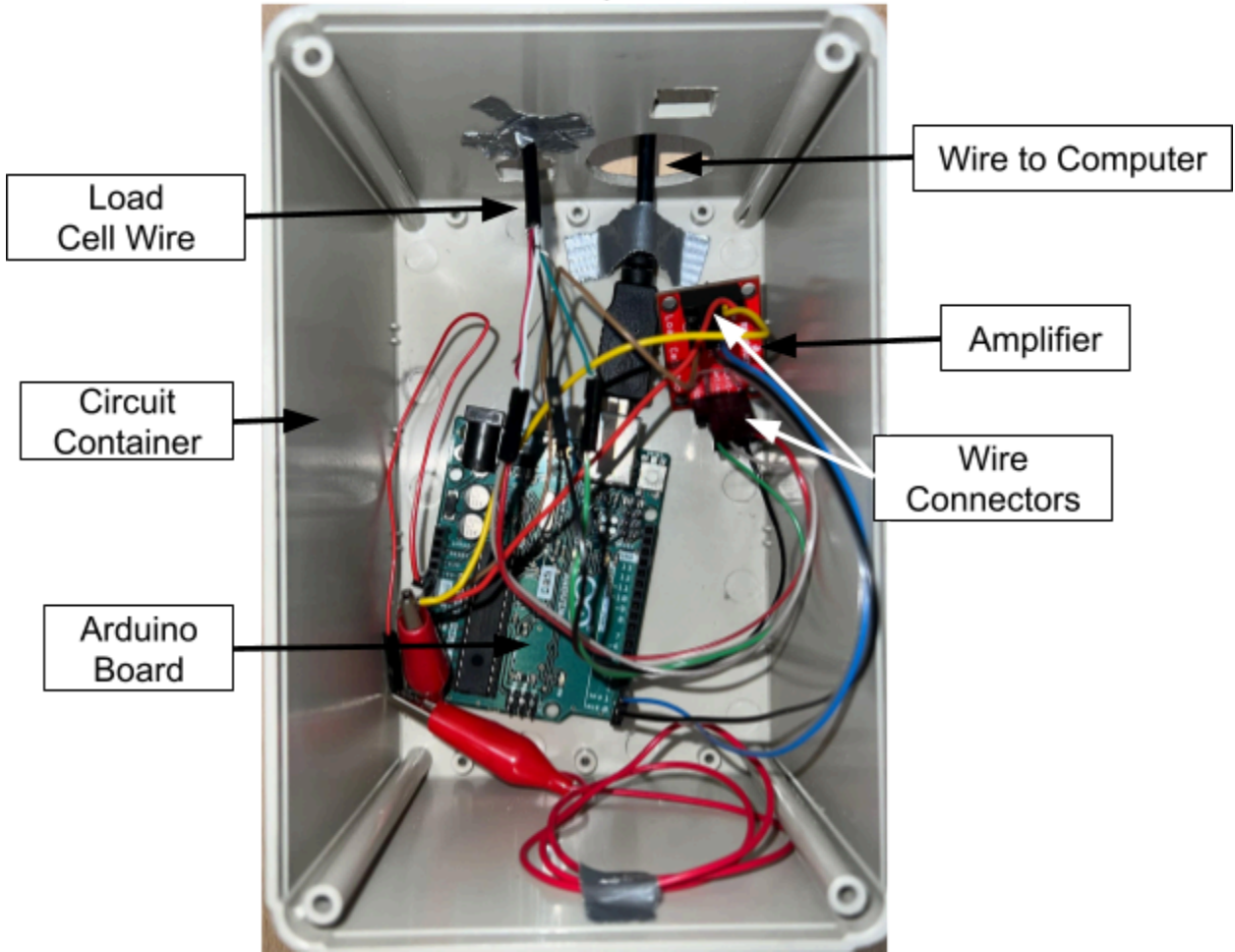
The team is still struggling to find load cells that will work for our application while still being within budget. The capacity requirements as well as the number of load cells required make the potential cost quite high.

## Current design

Final design from last semester:



### Circuit Components



### Materials and expenses - None yet

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



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

## Previous week's goals and accomplishments

- Neha:
  - I found videos on hooking up an HX711 load cell to Raspberry Pi
- Alicia:
  - Researched display options for both the Arduino Uno and the Raspberry Pi 4 microcontrollers.
  - Made a design matrix detailing the advantages and disadvantages of different modes of display.
- Emily:
  - Came up with a couple of load cell housing designs, building off of last semester's ideas
  - Looked up cells to purchase
- Colin:
  - Came up with design matrix criteria.
  - Brainstormed 3 ideas for the load cell housing.
- Simmi:
  - Researched raspberry pi circuits
  - Look up circuit components used to combine load cells
- Team previous goal: Create design matrices for load cell housing and display
  - Brainstormed, designed, and evaluated designs for load cell housing and display

## Activities

Name	Date	Activity	Time (h)	Week Total (h)	Sem. Total (h)
Emily Wadzinski	2/13/24	Brainstorming with Neha and Colin	3	3	12
Emily Wadzinski	2/14/24	Redrawing official designs for matrix	1	4	13
Simerjot Kaur	2/14/24	Preliminary Research	4	4	13
Neha Kulkarni	2/13/24	Brainstorming with Colin and Emily	3	3	13
Neha Kulkarni	2/14/24	Researching Raspberry Pi	2	5	18
Alicia Moeller	2/12/24	Research displays for raspberry pi	5	5	14
Alicia Moeller	2/14/24	Display design matrix	2	7	16
Colin Fessenden	2/13/24	Brainstorming with Neha and Emily	3	3	12
Colin Fessenden	2/14/24	Design Matrix Criteria	1	4	13

