Mon-Fri 2013.06.24-28 LL

Monday
- We Skyped Prof Ruina again (I might have my dates mixed up) and he challenged our statement about the seat of the Concept II Dynamic Erg being essentially steady during rowing. While the seat is able to slide, during the physical act of rowing / working out on the machine, we noticed that in actually, the seat and person hardly moves. However, Prof Ruina said that this is not sufficient to conclude that the seat essentially does not move and we will need to do more research on this.
- Andrea was not yet back from a hiking trip, so Steven and I split tasks. He read up on some papers while I used Tracker (the tool mentioned in Fri 2013.06.07 LL) to track the seat position on a Concept II video of rowing on the Dynamic Erg that I found on Youtube. Unfortunately, the video does not have marked points to make video tracking easy. For example, the seat is all 1 color, making it difficult to distinguish 1 point on the seat from another. Thus, I had to manually click through 1000+ some frames of video to get the position graph. This seems ridiculous for 21st century technology... there has to be a better way to do this.
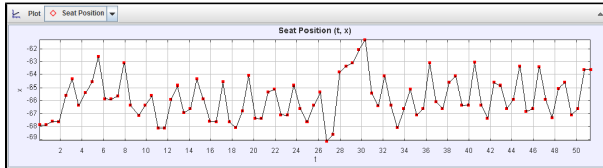

Figure 1: Seat position VS time for Concept II Dynamic Erg. Not sure if it's due to human error in manually clicking each point, but there doesn't seem to be much of a pattern in movement. However, the average movement is within 2-3 inches, which is small enough to not move the COM and support our above point.

Tuesday
- I found that I had been using the program incorrectly. =(Velocity and acceleration curves are supposed to be automatic and calculated in conjunction with the position data. However, they were empty for my set. Did some digging online and found this manual.
- We were curious to see how the Rowgometer compared to the competition. After fixing the chains and other loose parts, we took the machine downstairs to film in the hallway of Thurston. Before, all of our videos were at an angle, which makes it difficult to analyze the distances in a video for Tracker. Thus, we filmed the erg straight on while Andrea rowed. Steven volunteered his camera. Video footage: https://cornell.box.com/s/uoc5qbe0k5p9lzn3bd9p
- There was some glare coming from the windows that we hope won't impeded the video.

Wednesday
- Analysis of the video showed that the quality was not as high as we had hoped. Thus, we borrowed the fancy Canon VIXIA HF M52 HD camcord at Uris to do the filming. Since we had the camera, we figured that we might as well as officially film the other machines (stationary, erg on slides, dynamic) from the Rowing Room in Teagle. Having the same person row for all 4 videos will help keep the stroke movements somewhat consistent.
- We cut circles of neon green duct tape to use as tracking dots for our points of interest. For the erg on slides, Dynamic, and Rowgometer, we placed points on the handle, seat, and erg. For the stationary erg, since the erg does not move, we only had 2 points of interest. We used such bright dots because the Tracker program needs points that are clearly defined from the pixels around it, and uses oval shapes to define the point area.
- Everything was fine and dandy until after we downloaded the video files from the files, we saw that due to some camera setting, all footage was filmed in .MTS file format. We will need to convert this to a more common file format such as .MOV or .MP4 for Tracker to analyze. See video files in the 2013.06.26 Rowing Filming folder on BOX.
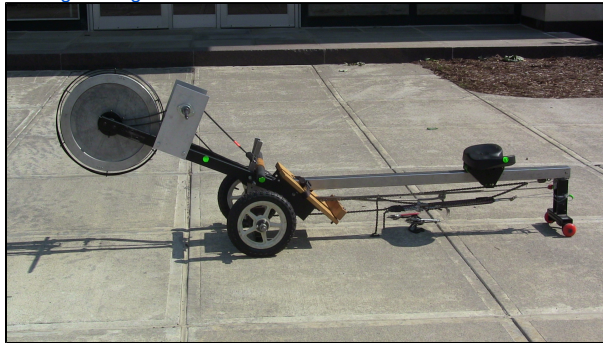

Figure 2: The Rowgometer got some sun in our outdoor filming session. Bright neon green dots indicate the points of interest: the Erg, the handlebars, and the seat.

Thursday & Friday
- We hit up Mann Library because they have a lot of video editing software on their Macs and PCs. Plus, school computers have more processing power than laptops, generally, and it's more secure to try and download programs on them, since the changes are deleted when the computer restarts.
- To convert .MTS to .MP4, we began with a free software called Brosoft, which is supposed to be one of the best programs out there. However, with the free trial version, all videos come with their company's logo watermarked in the middle.
- Although the watermark would not have impeded the analysis, we wanted our video to look more professional and thus looked into some other options. The 2nd conversion was with Arcsoft, whose video quality seemed a little lesser than Brosoft, with a more dodged (whitened out) look. We decided to go with this one, since the quality was still pretty good.
- Next, we used yet another software called Free Video Dub to shorten the video to include only the frames with good rowing. Since we had already altered the video via file type, we wanted to minimize additional quality loss from compression. FVD does not re-encode the video, so no quality is lost.
- After the videos were finally converted, we broke up the work with 1 video per person to analyze on Tracker, and whoever finishes first working on the last video. Tracker supposedly has an autotracking feature but it was extremely tricky and glitchy to use. Tracker, in general, crashed a few times until I figured out that the .JAR file or older versions of the .EXE type works better and does not require installation on the computer (which is great). Just before the library closed for the day, I found this helpful video of a guy running Tracker 3.10 (current version is 4.8) and using the autotracking feature.