ME/BIOE 481. LAB 1: Stability

Lab Developers: Mariana Kersh, Sony Manandhar, Chenxi Yan
Updated: February 11, 2021

Name: _____

Name: _____

1 Critical info

- Due date: February 15, 2021 - 1PM (US Central standard time)
- You may work in pairs. Include your names at the top of your lab report. You and your partner will receive the same grade. Only one person needs to turn in the assignment to compass. It can be neatly handwritten or typed (typed is preferred for text). Let the pride in your work show in the quality/legibility of the assignment you turn in. Illegible writing or poor scans/uploads will not be graded.
- Show all work! Please attach your MATLAB code along with your report.

2 Report deliverables

1. In your own words, state the purpose of this experiment
2. Draw a labeled diagram of your experimental set up
3. Provide a still image of your subject in the sagittal plane
4. Plot the position of the center of mass in the sagittal plane for a representative trial for each condition.
5. Using the anterior-posterior position, fill in the data for the table below (recreate it, please don't squeeze your numbers in here - it's too small/hard to read)

Trial	Condition (open or closed)	Mean	St Dev	Range
1				
2				
3				
4				
5				
6				
	OVERALL MEAN			

6. How does whether your eyes are open or closed affect the center of mass? Are all outcome measures (mean, st dev, and range) equally affected? Support your conclusions with data.
7. Using one eyes open trial, plot the anterior-posterior position of center of mass with respect to time.
8. Using the same trial, plot the horizontal acceleration of the center of mass. You may need to smooth your position data first.
9. Using the same trial from questions 7 and 8, evaluate the reasonableness of the inverted pendulum model. Support your answers using data.

   a. Calculate the location of the center of pressure (distance p in the lecture notes). Are the values for the center of pressure location reasonable? (For example, an unreasonable center of pressure distance would be greater than the size of your foot).

   b. How valid is the assumption of a rigid pendulum? (hint: the ankle and hip marker data can help you answer this).