

MURC 2019

Presentation ID: 151

Presentation Format: 10-Minute Oral Presentation

Presentation Title: Standing Balance Along the Medial-Lateral Direction

The kinematics of anterior-posterior (AP) standing balance of humans can be represented as an inverted pendulum. In this simplified model, a single point mass represents the whole body and the ankle joint represents the pivot point. The inverted pendulum model of standing balance has a wide range of applications in experimental and clinical research, in part due to its unique degree of freedom. The purpose of our research is to gain a further understanding of human standing balance along the medial-lateral (ML) direction. Describing the kinematics of ML motion for standing balance appears more complicated than AP motion. Considering the two legs and the torso, we can construct a model of ML standing balance with 5 degrees of freedom. The goal of our study was to simplify this model using the inverted pendulum approach from AP motion. We explored two main modeling approaches: 1) assuming that the change in angle between the torso and hips is negligible and 2) approximating the ankle and hip joints as a four-bar linkage, with the feet as the two constraints. The four-bar linkage provides angular constraints such that all four angles can be represented as a function of a single angle, thus reducing the degrees of freedom from 4 to 1. These results show that ML motion can be modelled as an inverted pendulum, which can be implemented into applications including a robotic machine.

Themes:

Check (highlight) the most applicable theme according to the abstract.

<input type="checkbox"/> Innovation and Technology	<input type="checkbox"/> Health and Wellness	<input type="checkbox"/> Culture and Society	<input checked="" type="checkbox"/> Sustainability and Conservation
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Comments:

Commented [WS1]: Describe this more – remember, MURC is a multidisciplinary conference – which includes individuals from diverse backgrounds. Also, how does this relate to AP since you mentioned the topic in the first part of your abstract? How does it tie in with MP?

Commented [WS2]: Why? I would expand on this more if you wish to include.

Commented [WS3]: Ah! I would put this further up to make the connection between AP and MP.

Commented [WS4]: Further elaborate what this means in terms of future applications – specifically with robotic machines – is it research implications? Technological? Why is your research significant?