

download here]]). another article using the rab upper body model can be [[http://www.iprmd.org/downloads/publications/james/27_upper.pdf][downloaded here]]. \\ \\ the thorax/ab segment is constructed from virtual landmarks on the lateral superior borders of the iliac crest and virtual landmarks at the shoulder joint centers. ==== iliac crest landmarks ==== the iliac crest landmarks were estimated using the [[visual3d:documentation:modeling:muscles:overview#terry_database|terry database]] published as: **kepple tm, sommer hj, siegel kl, standhope sj** (1998) a three-dimensional musculoskeletal database for the lower extremities. journal of biomechanics 31, pp 77-80 this landmark was not part of the original terry database, but we estimated the position from the database that can be downloaded [[https://www.has-motion.com/download/terry_data.zip][here]]. the medial/lateral and superior/inferior location of the **right_iliac** and **left_iliac** landmarks were defined as the most lateral point on the superior tubercle of the iliac crest (landmarks 39 & 40 of the terry pelvis dataset) the anterior/posterior location of the **right_iliac** and **left_iliac** landmarks were defined as the lateral surface of the right ilium at midpoint between most lateral point on superior tubercle of the iliac crest and origin of the gluteus medius posterior fibers {landmarks 43 & 44 of the terry pelvis dataset) the location of terry landmark 39 is (22.332 , -54.477 , 29.705) the location of terry landmark 40 is (-251.082 , -49.732 , 36.540) these values were averaged for creating the landmark. from the terry dataset the distance between the asis landmarks (terry landmarks 1&2) is approximately 228 which is defined as the x-axis of the pelvis. the x-component of the **right_iliac** landmark in pelvis coordinates is $(114+22.7)*\text{asis_distance}/228$ the z-component of the **right_iliac** landmark in pelvis coordinates is $(33.1)*\text{asis_distance}/228$ from the terry dataset the perpendicular distance from the x-axis to the mid-point of the psis landmarks (terry landmarks 3&4) is approximately 143.5 in visual3d create a subject/model metric to compute this distance as the distance from the sac marker to the mid-point of the rasi and lasi markers. rab6.jpg the y-component of the **right_iliac** landmark in pelvis coordinates is $(-54.477)*\text{asis_sacr}/143.5$ create the **right_iliac** landmark using these values as. rab7.jpg in summary: the right_iliac landmark is defined as: existing segment= pelvis ml= $(114+22.332)*\text{asis_distance}/228$ ap= $(-54.477)*\text{asis_sacr}/143.5$ axial= $(33.1)*\text{asis_distance}/228$ \\ the left_iliac landmark is assumed to be located symmetrically and defined as: existing segment= pelvis ml= $-(114+22.332)*\text{asis_distance}/228$ ap= $(-54.477)*\text{asis_sacr}/143.5$ axial= $(33.1)*\text{asis_distance}/228$ rab8.jpg ==== construct the segment ==== we have now created all the needed landmarks for the thorax/ab segment. to create the thorax/ab segment in visual 3d: - click on **segments** tab - from the **segment name** box, select //thorax/ab// - from the **segment type** box, select //visual 3d// - click **create**. a dialog will open that will allow us to define the segment. - in the **define proximal joint and radius** section, select //right_iliac// for the **lateral** and select //left_iliac// for the **medial** - in the **define distal joint and radius** section, select //rsho// for the **lateral** and select //lsho// for the **medial** - in the **select tracking targets**, click on //c7//, //strn//, //lsho//, //rsho// - in the **depth (meters)** box, enter //0.12// - click on **build model** rab11.jpg you should now see a thorax segment on your standing model. if you do not see the thorax segment after clicking build model, double check the values you entered in the last step. rab12.jpg note that the z-axis of the segment (blue line) is pointing down, so we must fix that. rab13.jpg switch to the segment properties tab, select the thorax/ab segment in the combo box, and select modify segment coordinate system. rab14.jpg select the ap direction to be -y and the axial direction to be -z this may seem a little strange at first because it is certainly an option to create the segment with the acromion at the proximal end and the iliac crest at the distal end. placing the proximal end of the thorax/ab segment at the pelvis essentially places two proximal ends together (e.g. the thorax/ab and pelvis), but now the distal end of the thorax/ab segment is at the shoulders, which allows the creation of shoulder and neck joints (e.g. the arms and head are considered distal segments of the body). rab15.jpg ===== references ===== **isb thorax**: wu, ge, et al. "isb recommendation on definitions of joint coordinate systems of various joints for the reporting of human joint motion—part ii: shoulder, elbow, wrist and hand." journal of biomechanics 38.5 (2005): 981-992. **rab thorax**: rab, george, kyria

petuskey, and anita bagley. "a method for determination of upper extremity kinematics." gait & posture 15.2 (2002): 113-119. }

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