

here]]. the landmarks are stored in ascii files. the structure of the data set is described in the files. an excerpt from the femur landmarks is presented here: description of landmarks digitized on the femur each landmark is listed in the same order as they appear in the corresponding model files. the model file format is: (landmark #) x y z (# of specimens used to generate norm landmark) x is approximately anterior, y is superior, and z is right units are mm this file contains for each landmark: - landmark number followed by a description of where the landmark is located. - landmark type. the landmark type can be either externally palpable, muscle origin, muscle insertion, muscle connector (to wrap muscle around bone or through retinaculum), joint center (assumed to be a point of contact with the adjacent segment), or anthropometric (a point which may be of value for traditional anthropology measurements). - list of muscles associated with the point (origin, insertion or connector). ===== affine scaling of a terry landmark ===== sommer h, miller n, pihanowske g (1982) three-dimensional osteometric scaling and normative modeling of skeletal segments. journal of biomechanics 15, pp 171-180. the linear algebra technique described in this article, **termed affine scaling**, scales the data based on all measured landmarks and allows for the statistical accumulation of landmark data in order to generate normative models. each landmark is defined relative to 3 or 4 landmarks that were selected to be palpable on living subjects (for example, the thigh landmarks are defined relative to the greater trochanter, the lateral epicondyle, and the medial epicondyle). ===== visual3d representation of a terry landmark ===== the following visual3d command is used to define a landmark representing the **origin of the right medial gastrocnemius muscle** based on **affine scaling** **add_landmark_using_affine_scaling**

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///visual3d_landmark_name=origin_rt_gastroc_med// //// /calibration_file=*model.mdh
/linkmodel_marker_names=rgt+rlk+rmk
/landmark_location_in_local_coordinate_system=-26.117+-381.432+-24.205 /segment_name=rth
/marker1_in_local_coordinate_system=0+0+0
/marker2_in_local_coordinate_system=0+-380.878+43.317
/marker3_in_local_coordinate_system=0+-394.841+-43.317 ! /marker4_in_local_coordinate_system=
/scale_ml=false /scale_axial=true //; note that the mocap markers/landmarks for the three
homologous anatomical points must exist in the model file. lgt= left greater trochanter\\ llk= left
lateral knee (epicondyle)\\ lmk= left lateral knee (epicondyle) in the above example, the terry
information for the thigh segments (femur.txt) required are the following: 1) most lateral point on
greater trochanter type:palpable landmark muscle: 2) most lateral point on lateral epicondyle type:
palpable landmark muscle: 3) most medial point on medial epicondyle type: palpable landmark
muscle: 30) most superior point on medial condyle type: muscle origin muscle: origin of
gastrocnemius medial head the numerical values associated with these locations for a white male
are stored in the file femur.mod femur - right and left - 26 males, 26 females 41 landmarks |1 |0.000
|0.000 |0.000 |104.000| |2 |0.000 |-380.878|43.317 |104.000| |3 |0.000 |-394.841|-43.317|104.000|
|.....| | | | |30 |-26.117|-381.432|-24.205|104.000| ===== example data set with meta commands and
pipeline ===== this is an
[[https://www.has-motion.com/download/examples/terrydemoblank.cmo|example data]] set
compatible with the terry database. download the
[[https://www.has-motion.com/download/examples/terrymetacommands.zip|meta-commands]] and
place them in a folder labeled meta-commands inside the visual3d plugins folder download the
example [[https://www.has-motion.com/download/examples/terryexamplepipeline.v3s|visual3d
pipeline]]. note to download this file, right mouse click on the link and save the link to your computer.
load the cmo file into visual3d execute the pipeline to create visual3d representations of a collection
of the terry database muscle. note that the first command of this example pipeline specifies the
folder containing the data. you will need to recreate this folder path or specify the path on your
computer. ===== visual3d meta-command for a terry muscle ===== as an example, the
gastrocnemius muscle can be defined using the following meta-command ! begin_meta\\ !
meta_cmd_name=terry_rt_plantar_flexors_group\\ ! meta_param= model_name : string ::yes\\ !

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meta_param= right_thigh_markers : string ::yes\\ ! meta_param= right_shank_markers: string ::yes\\ !
meta_param= right_foot_markers: string ::yes\\ ! end_meta \\ ! -----\\ ! gastrocnemius\\ ! -----\\
**add_landmark_using_affine_scaling**\\ /visual3d_landmark_name=origin_rt_gastroc_med\\
/calibration_file=::model_name\\ /linkmodel_marker_names=::right_thigh_markers\\
/landmark_location_in_local_coordinate_system=-26.117+-381.432+-24.205\\ /segment_name=rth\\
/marker1_in_local_coordinate_system=0+0+0\\
/marker2_in_local_coordinate_system=0+-380.878+43.317\\
/marker3_in_local_coordinate_system=0+-394.841+-43.317\\ !
/marker4_in_local_coordinate_system=\\ /scale_ml=false\\ /scale_axial=true\\ ;\\
**add_landmark_using_affine_scaling**\\ /visual3d_landmark_name=tether_rt_gastroc_med\\
/calibration_file=::model_name\\ /linkmodel_marker_names=::right_thigh_markers\\
/landmark_location_in_local_coordinate_system=-37.929+-401.247+-20.216\\ /segment_name=rth\\
/marker1_in_local_coordinate_system=0+0+0\\
/marker2_in_local_coordinate_system=0+-380.878+43.317\\
/marker3_in_local_coordinate_system=0+-394.841+-43.317\\ !
/marker4_in_local_coordinate_system=\\ /scale_ml=false\\ /scale_axial=true\\ ;
**add_landmark_using_affine_scaling**\\ /visual3d_landmark_name=insertion_rt_gastroc_med\\
/calibration_file=::model_name\\ /linkmodel_marker_names=::right_foot_markers\\
/landmark_location_in_local_coordinate_system=-0.529+1.120+-0.726\\ /segment_name=rft\\
/marker1_in_local_coordinate_system=0+0+0\\
/marker2_in_local_coordinate_system=85.524+0+-35.699\\
/marker3_in_local_coordinate_system=88.645+0+35.699\\ ! /marker4_in_local_coordinate_system=\\
/scale_ml=false\\ /scale_axial=false\\ ; **add_landmark_based_muscle**\\
/muscle_name=rt_gastroc_medialis\\ /landmark_origin=origin_rt_gastroc_med\\
/landmark_tethers=tether_rt_gastroc_med\\ /landmark_insertion=insertion_rt_gastroc_med\\
/link_model_name=::model_name\\ ; **add_landmark_using_affine_scaling**\\
/visual3d_landmark_name=origin_rt_gastroc_lat_plantaris\\ /calibration_file=::model_name\\
/linkmodel_marker_names=::right_thigh_markers\\
/landmark_location_in_local_coordinate_system=-20.936+-373.101+18.664\\ /segment_name=rth\\
/marker1_in_local_coordinate_system=0+0+0\\
/marker2_in_local_coordinate_system=0+-380.878+43.317\\
/marker3_in_local_coordinate_system=0+-394.841+-43.317\\ !
/marker4_in_local_coordinate_system=\\ /scale_ml=false\\ /scale_axial=true\\ ;
**add_landmark_using_affine_scaling**\\ /visual3d_landmark_name=tether_rt_gastroc_lat_plantaris\\
/calibration_file=::model_name\\ /linkmodel_marker_names=::right_thigh_markers\\
/landmark_location_in_local_coordinate_system=-30.662+-390.245+23.209\\ /segment_name=rth\\
/marker1_in_local_coordinate_system=0+0+0\\
/marker2_in_local_coordinate_system=0+-380.878+43.317\\
/marker3_in_local_coordinate_system=0+-394.841+-43.317\\ !
/marker4_in_local_coordinate_system=\\ /scale_ml=false\\ /scale_axial=true\\ ;
**add_landmark_using_affine_scaling**\\
/visual3d_landmark_name=insertion_rt_gastroc_lat_plantaris\\ /calibration_file=::model_name\\
/linkmodel_marker_names=::right_foot_markers\\
/landmark_location_in_local_coordinate_system=-0.529+1.120+-0.726\\ /segment_name=rft\\
/marker1_in_local_coordinate_system=0+0+0\\
/marker2_in_local_coordinate_system=85.524+0+-35.699\\
/marker3_in_local_coordinate_system=88.645+0+35.699\\ ! /marker4_in_local_coordinate_system=\\
/scale_ml=false\\ /scale_axial=false\\ ; **add_landmark_based_muscle**\\
/muscle_name=rt_gastroc_lateralis\\ /landmark_origin=origin_rt_gastroc_lat_plantaris\\
```

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/landmark_tethers=tether_rt_gastroc_lat_plantaris\\  
/landmark_insertion=insertion_rt_gastroc_lat_plantaris\\ /link_model_name=:model_name\\ ; =====  
pipeline command for above meta-command ===== a meta-command is a visual3d pipeline into  
which **parameters can be passed** the meta-command should be stored in a folder labeled **meta-  
commands**, which is located in the visual3d **plugins** folder. the header in the meta-command  
defines the data that should be passed: ! begin_meta !  
meta_cmd_name=terry_rt_plantar_flexors_group ! meta_param= model_name : string ::yes !  
meta_param= right_thigh_markers : string ::yes ! meta_param= right_shank_markers: string ::yes !  
meta_param= right_foot_markers: string ::yes ! end_meta this command will appear in the visual3d  
pipeline dialog list box in a folder labeled **meta_commands.** the command will be similar to the  
following: **terry_rt_plantar_flexors_group** /model_name= *model.mdh /right_thigh_markers=  
rgt+rlk+rmk /right_shank_markers= ltt +rla+rma /right_foot_markers= rhl+rft2+rft1 ; }}
```

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