Release notes AMMR1.3.1

AMMR1.3 is identical to AMMR1.3.1 except otherwise noticed.

Application:

GaitLowerExtremityProject:

New gait model which is a reworked version of the GaitLowerExtremity model previously released. The model has the following highlights compared to the previous model:

- Initial position of the model wrt. the recorded markers can now be done by dragging the model in the ModelView, this is done using the new AnyDrawWidgetLin/Rot objects.
- The model features the new AnyProject object, which has been used to create descriptions and logical work tasks. This is all done to make it easier to load in new C3D data and make the model run. See Figure 1.
- The positions of the makers can now be adjusted directly in the ModelView, this is much faster.

In AMMR1.3.1 a small bug fix in the model now prevents the new project tab to be deselected when doing a load task, it will now stay open, this has no influence the results.

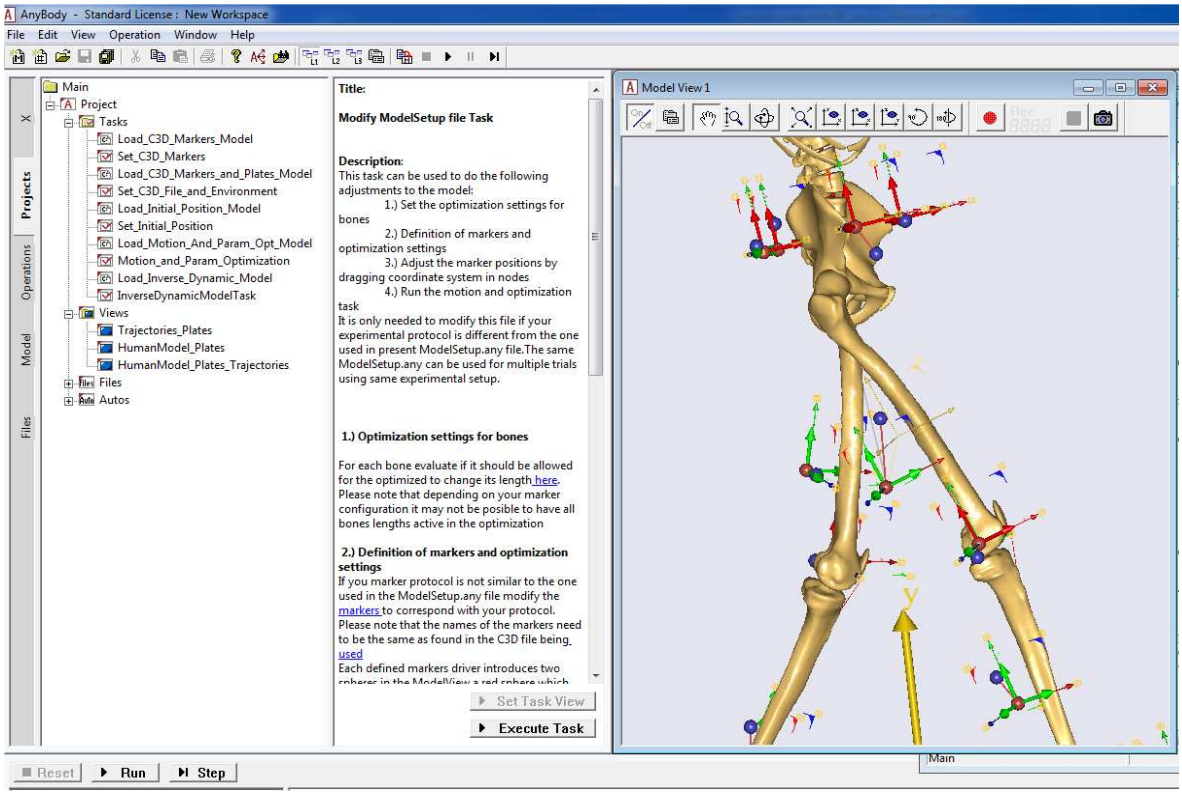

Figure 1 Screenshot from GaitLowerExtremityProject model. Notice the new project tab and the graphical widgets in the ModelView which can be used to modify marker positions.

StandingModelVisualization:

This model is based on the StandingModel it serves the purpose of demonstrating a number of visualization effects.

- Muscles forces can be displayed as force vectors, this can be very informative.
- The model has a moving camera which can be used to generate videos where the camera follows a certain point in the model.
- The colors of the muscles can now be done in a Finite Element manner, displaying different activities with different colors.

SpineFixationWithForceDepKinematics

This application is an example of how to use the new force-dependent kinematics. The force dependent kinematics allows the kinematic spine rhythm which normally drives the vertebras to be switched entirely off. The model consists of the spine model equipped with ligaments, facet joints and a fixation device acting between L4 and L5. The spine motion is calculated as a consequence of the forces in ligaments, facet joints, muscles and spine fixation device.

In AMMR1.3.1 the definition of the model drivers was changed to avoid unintended motion in sacrum pelvis joint, this change the results but the overall behavior is still the same.

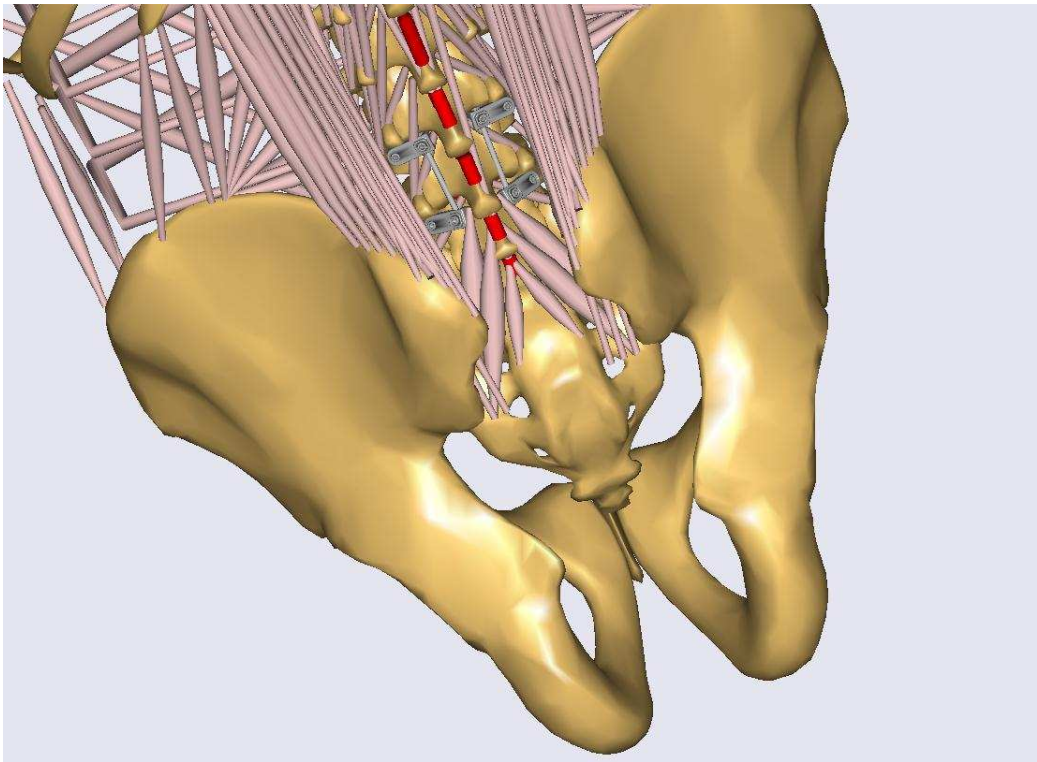

Figure 2 Screenshot from model. Notice fixation device between L4-L5, some muscles has been hidden to enable the device to be seen.

Body:

The triangulation of the bone files has been improved for better visualization and optimized graphical performance.

LegTD

Several modifications have been made to the leg model

- Biceps femoris caput breve: Third muscle element added, this was missing according to data.
- Soleus muscles: optimal fiber length set to 4.4cm, the original value of 2.4 is believed to be too small.
- Flexor Hallus Longus: Pennation angle corrected according to TLEM data.
- IlliacusLateralisViaNode1 corrected according to TLEM data.
- Added extra via points for Gluteus Maximus to improve moment arms.
- Corrected error in Adductor Magus attachment point.

- Ankle joint moved to the center of the talus, it was too much lateral. The orientation of the rotation axis is still exactly the same.

Arm

The joints between Thorax and Scapula have been updated to run with new parametric surface against point measure. This does not change the model, but is a more elegant solution, and should be more kinematically reliable.

ToolBox/FrictionContactMuscles

The conditional contact element which is used by models such as SeatedHumanModel and PedalDemoConditional has been wrapped into a class, which should make them easier to use. See the PedalDemoConditional for an example of its use.

Trunk

Scaling refinement in the abdominal model.

A complete set of the lumbar spine ligaments is now available in the Anybody Modelling repository. Intertransverse ligaments connecting transverse processes and responsible for the preservation motion during lumbar spine axial rotation were implemented for all levels/joints of the lumbar spine. Additionally, full sets of ligaments were introduced to the T12L1 and L5Sacrum levels.

In AMMR1.3.1 the intertransverse ligaments were split into two ligaments each, this enables the model to handle a larger spectrum of load cases.