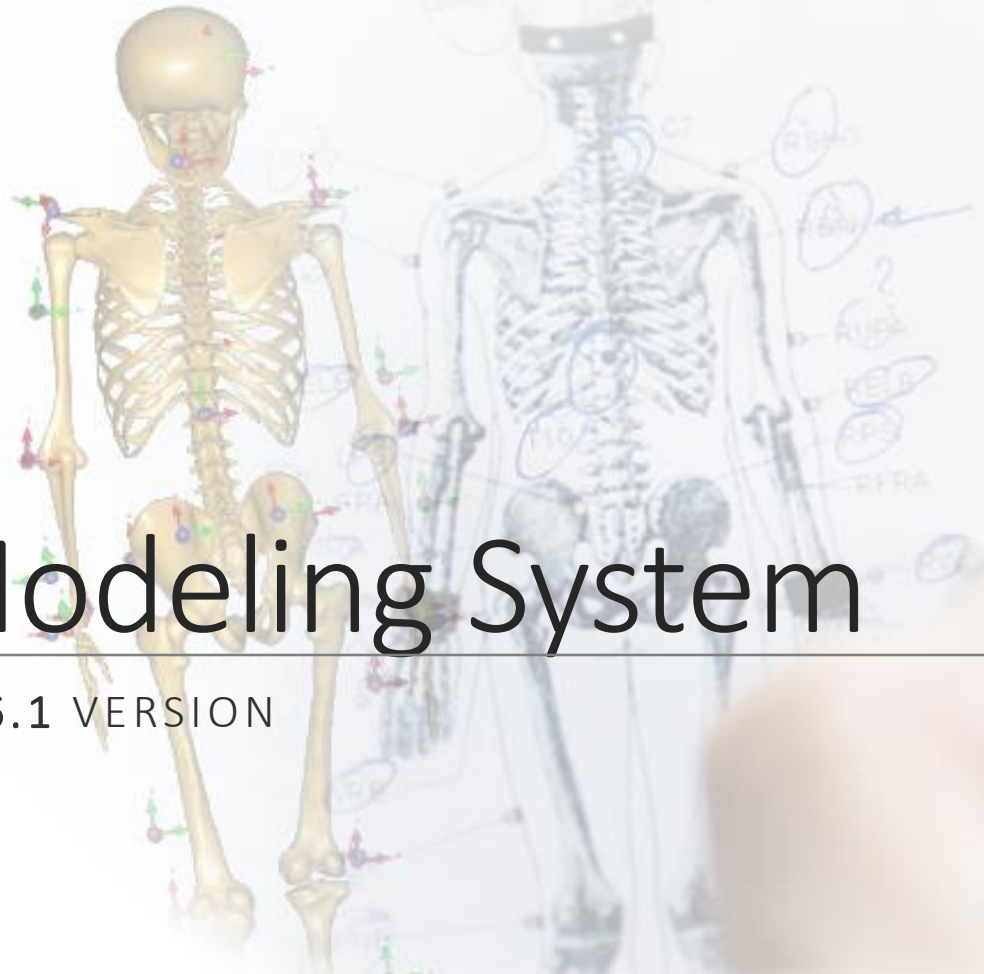
The webcast will start in a few minutes….

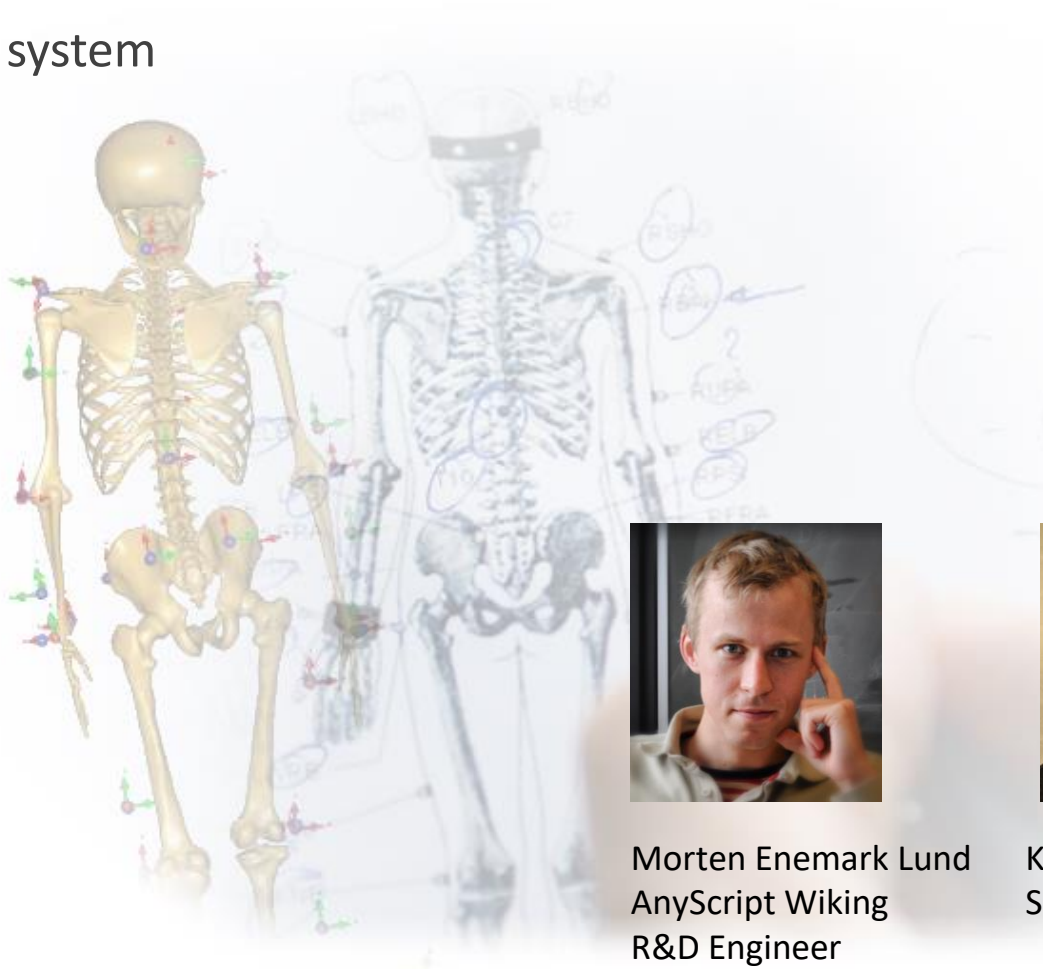


The AnyBody Modeling System

TOUR AND OVERVIEW OF THE NEW 6.1 VERSION

Outline

- General introduction to the modeling system
  - Software vs. models
  - What can it be used for?
- New features
  - Advanced kinematics
  - Working with BVH models
  - MoCap related improvements
  - Better graphics
- New community site and wiki
- Future plans
  - Sneak peak of AMS 7.0 and AMMR2.0
- Questions and answers



Morten Enemark Lund
AnyScript Wiking
R&D Engineer

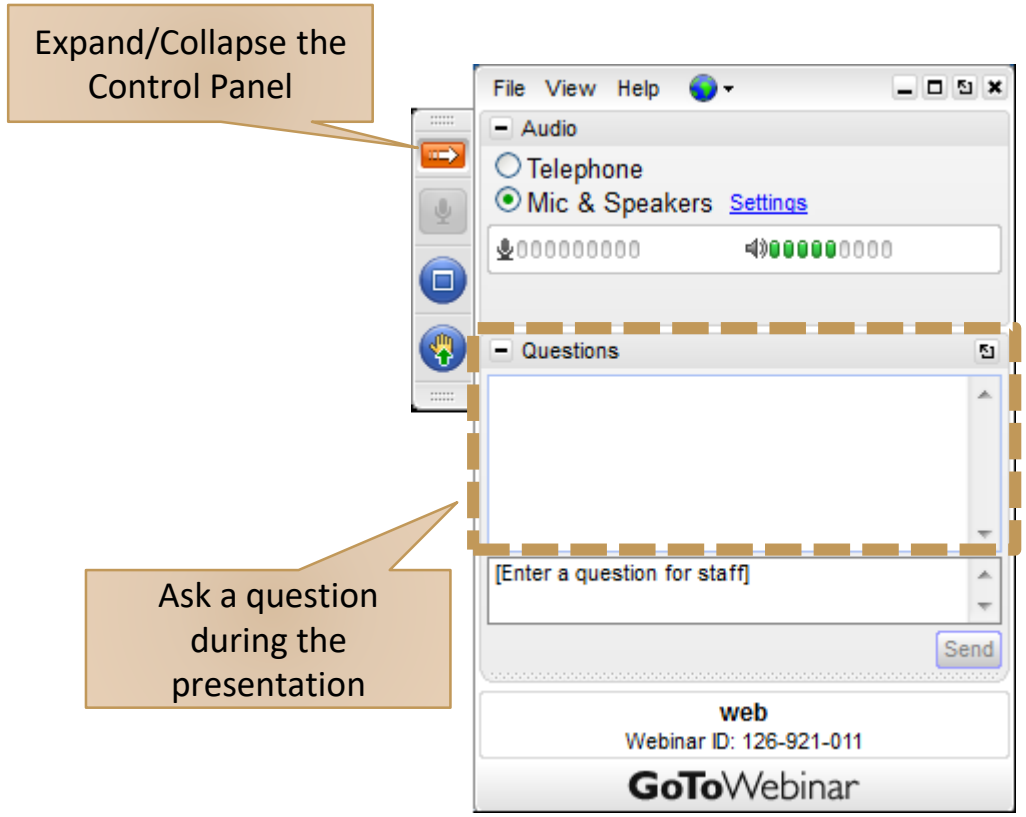
Kasper Pihl Rasmussen
Simulations Engineer

Control Panel

The Control Panel appears on the right side of your screen.

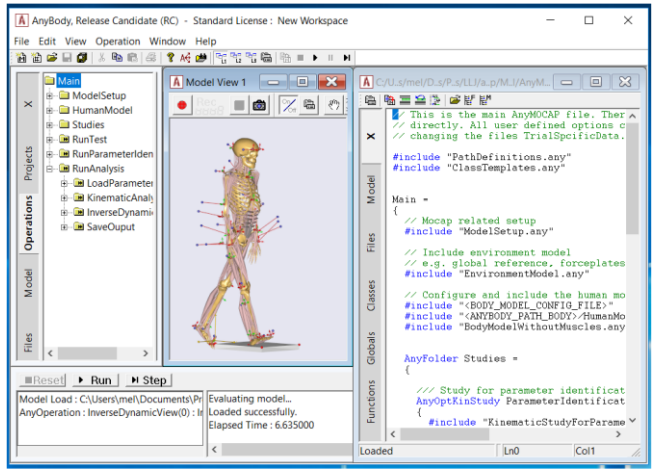
Submit questions and comments via the Questions panel.

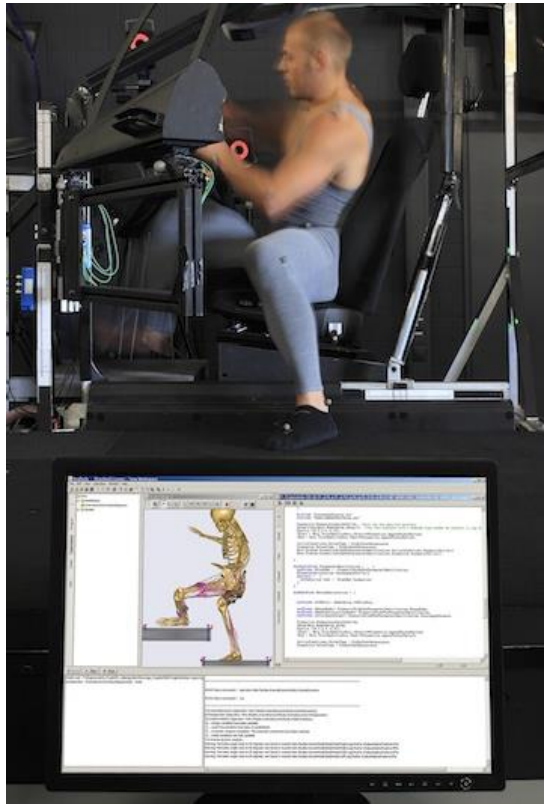
Questions will be addressed at the end of the presentation. If your question is not addressed we will do so by email.



AnyBody Modeling System

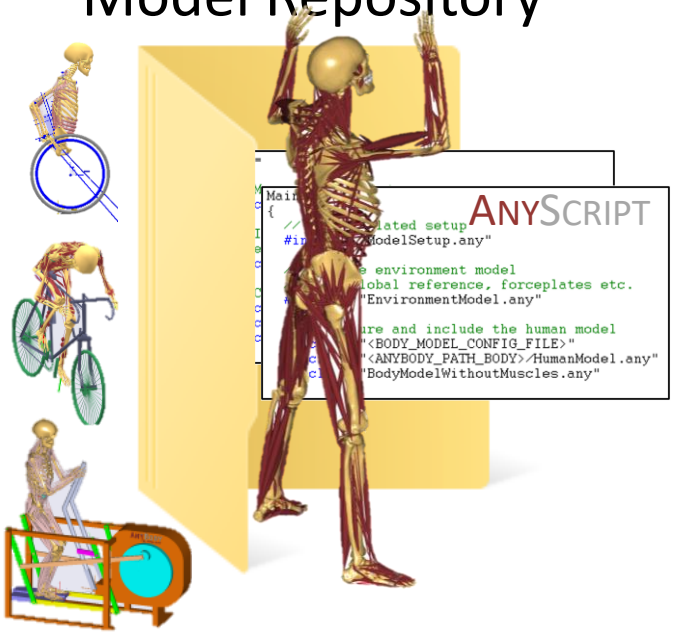
AnyBody Modeling System

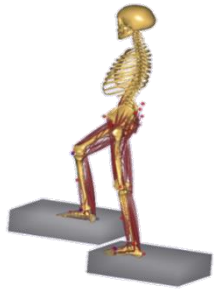




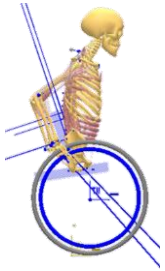
Rasmussen et. al. (2011), ORS Annual Meeting

AnyBody Managed Model Repository





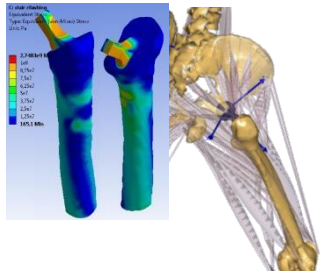
Movement Analysis



Product Design Optimization

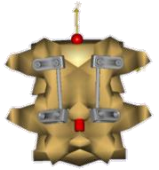
ANYBODY Modeling System

Ergonomic Analysis



Load Cases for Finite Element Analysis

Surgical Planning and Outcome Evaluation

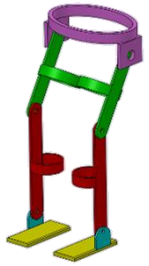


AnyBody Modeling System

Motion and Forces

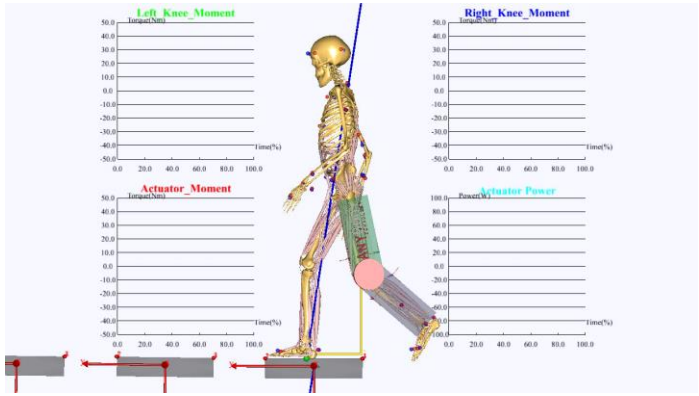
Body model

Environment model



Inverse dynamics
Muscle recruitment

Simulation



Internal body loads

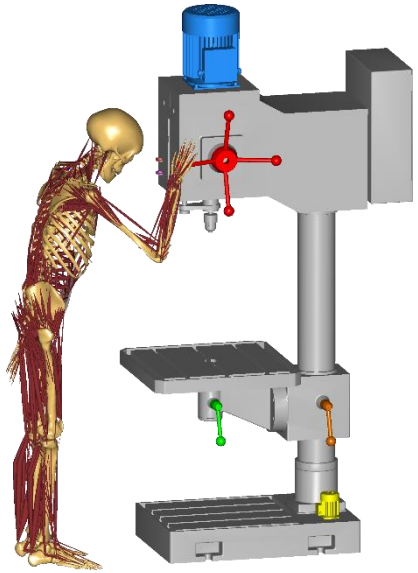
- Muscle forces
- Joint forces

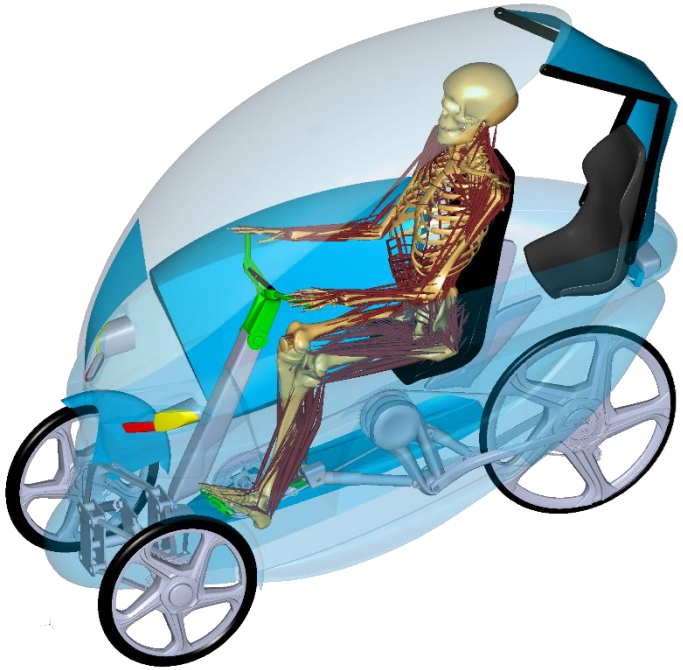
Design Optimization

Post Processing (e.g. FE tools)

Machine Design and Optimization

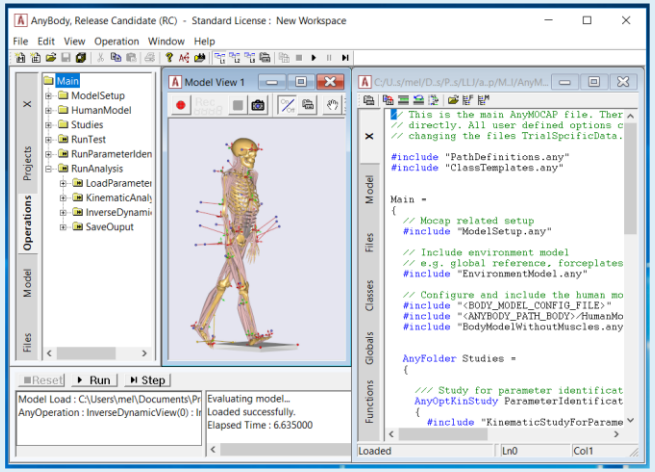
- AnyBody Exporter for SOLIDWORKS®
  - Plugin for SolidWorks
  - Import your machine's design from SolidWorks
  - Run Man-Machine simulations





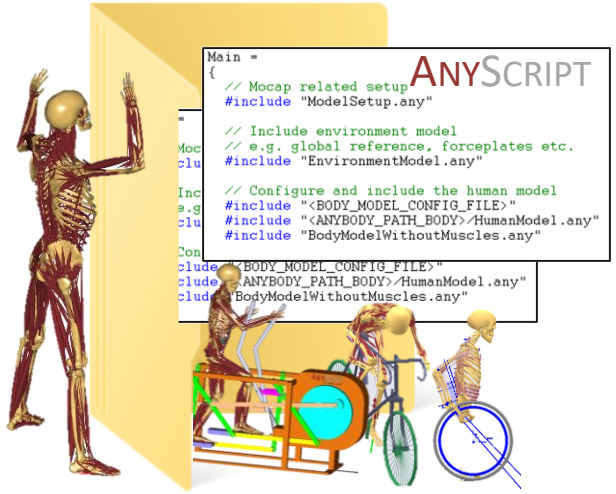
What is new in the release?

AnyBody Modeling System

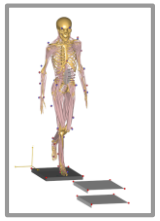


Version 6.1

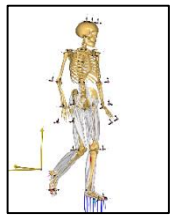
AnyBody Managed Model Repository



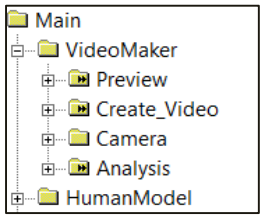
! **Note:** Still version 1.6



New MoCap framework



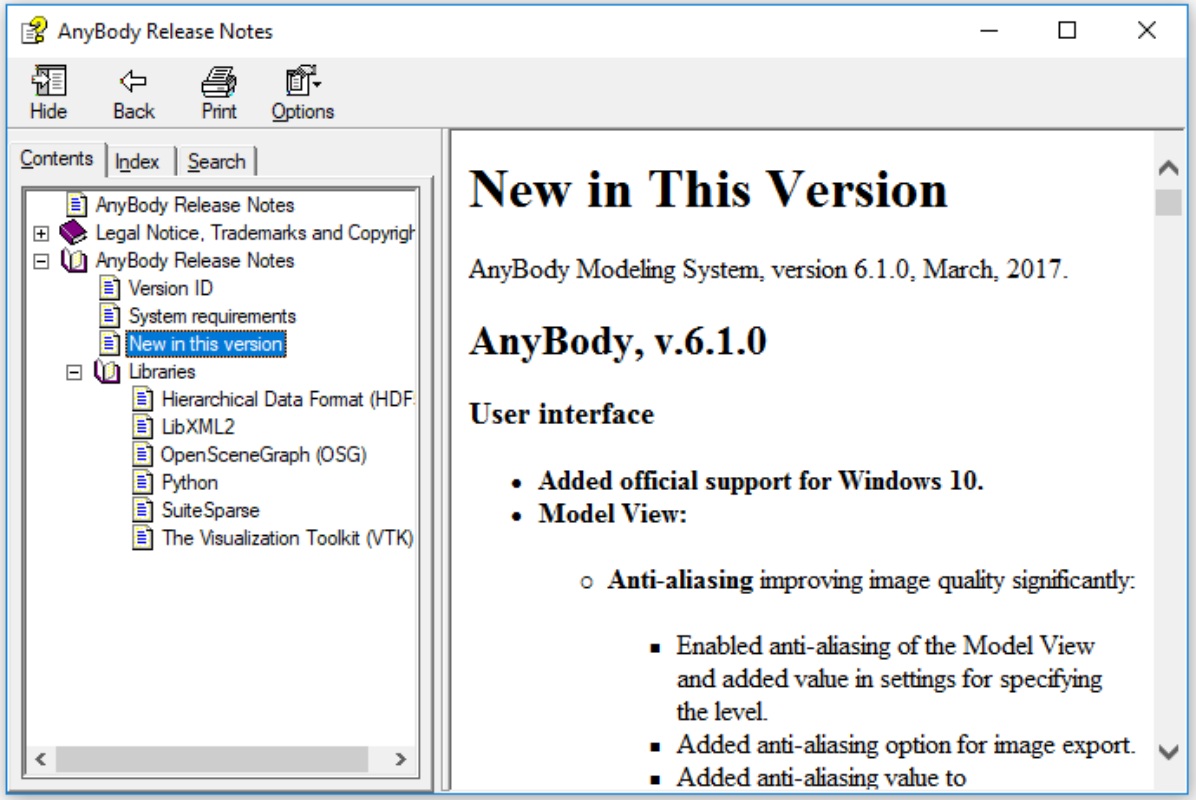
Example of an Inertial MoCap Model



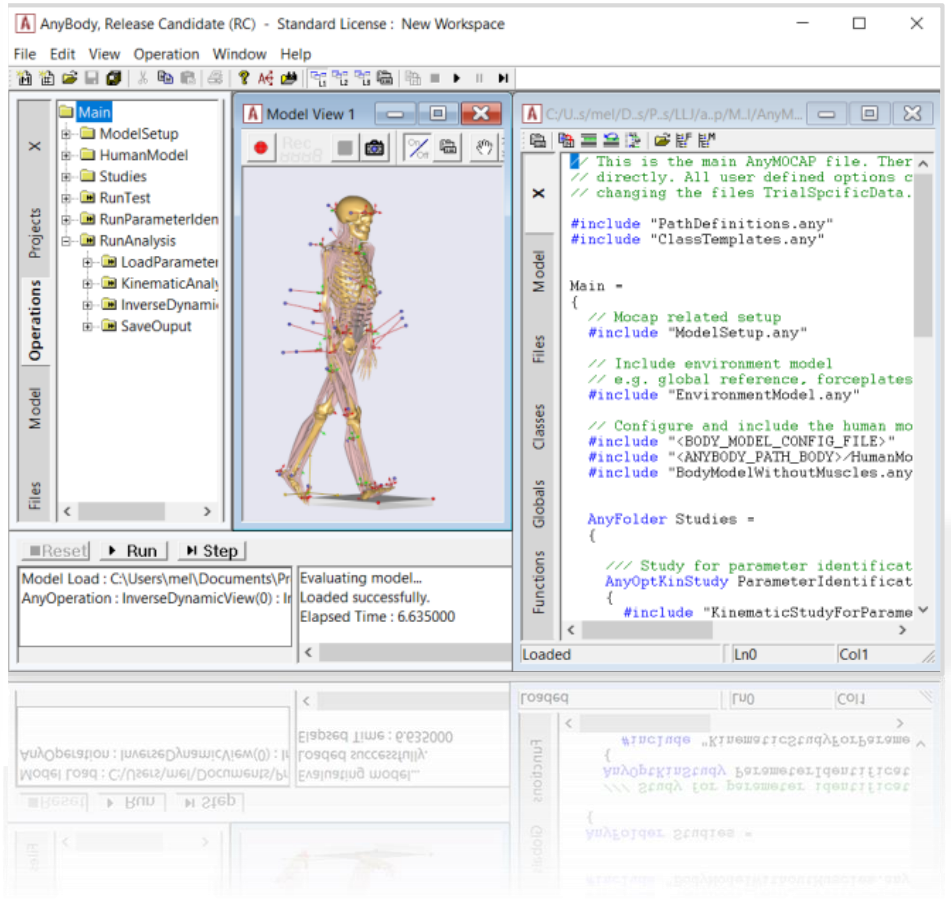
AnyScript plugin Making videos

Plus more examples

Release of v.6.1



Most changes are ‘under the hood’



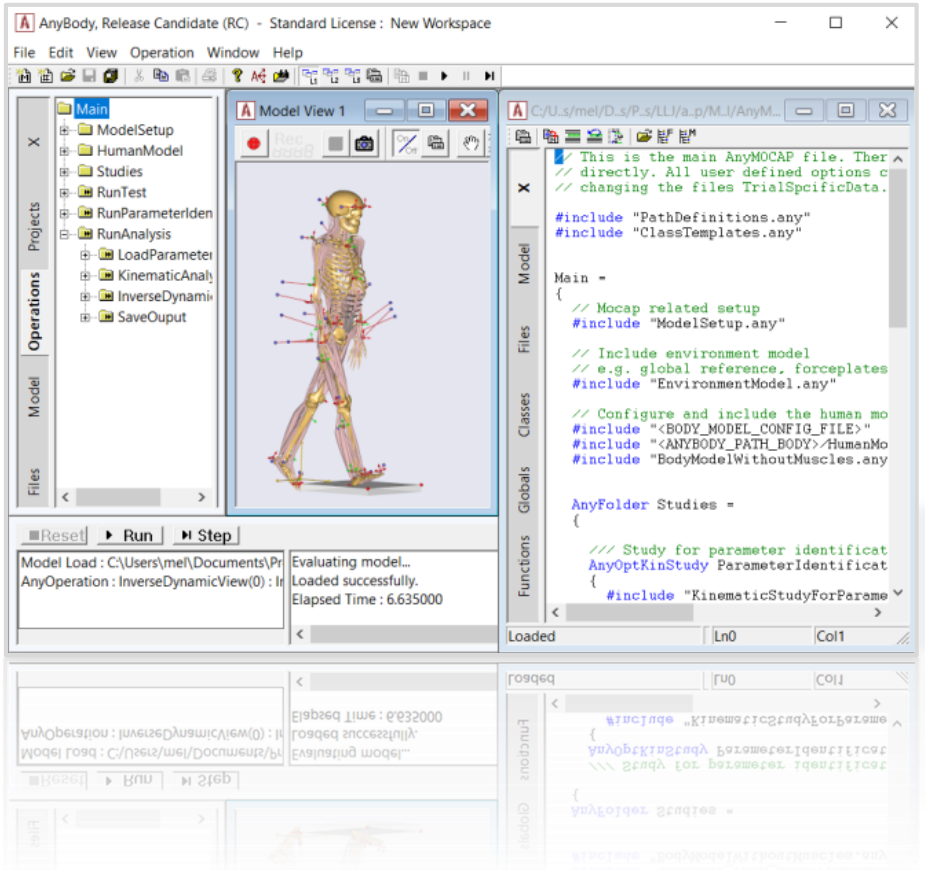
Release of v.6.1

Read the release notes to get a complete overview

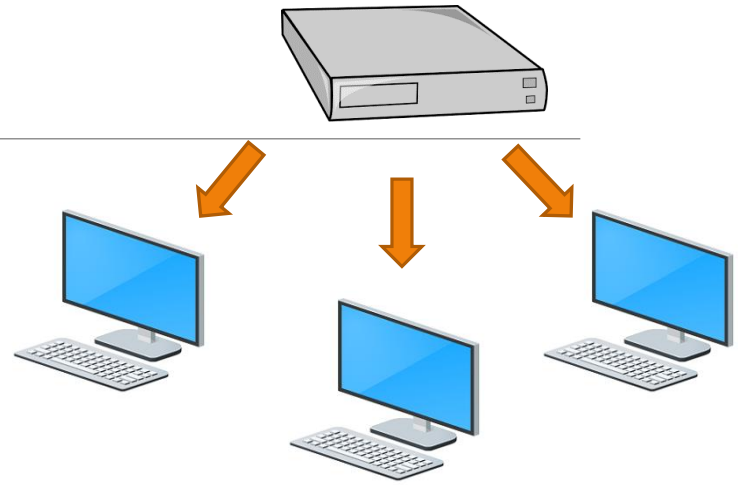
- New ANYSCRIPT classes and functions
  → `AnyKinMeasureFunComb1`
  → `AnyInputBVH`

- ANYSCRIPT language improvements
  → New MoCap framework

- Improved graphics in model view
  → Video creator tool



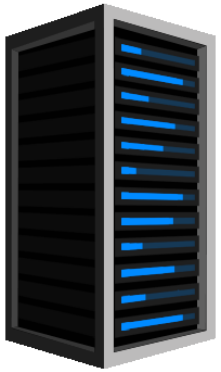
New license options



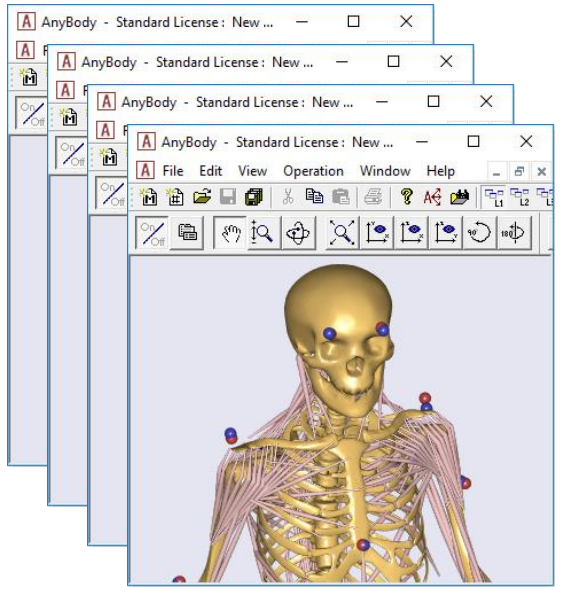
4 instances with a single floating license

💡 **Note:** A new license file is needed. Send email to: sales@anybodytech.com

- New License type for batch processing
  - Run without the GUI.
  - Batch processing, sensitivity studies, Design optimization.

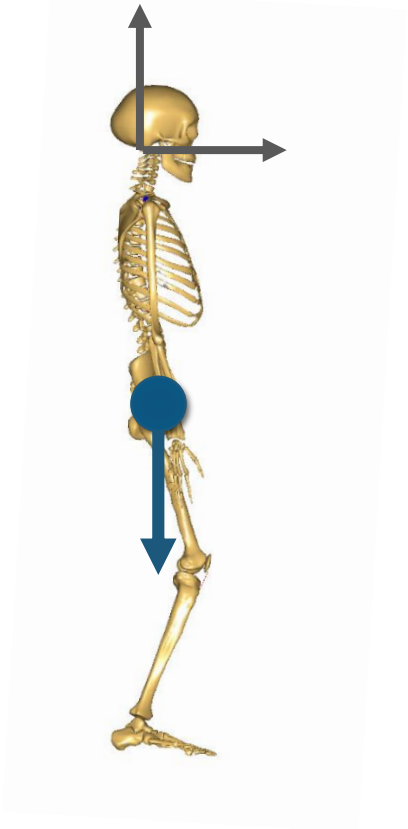


```
In [*]: T2SS = app3.start_macro(TLEM2_simple_sts, **models_sts);
        #app.save_results('TLEM2SimpleSTS.db')

        410 of 417
```



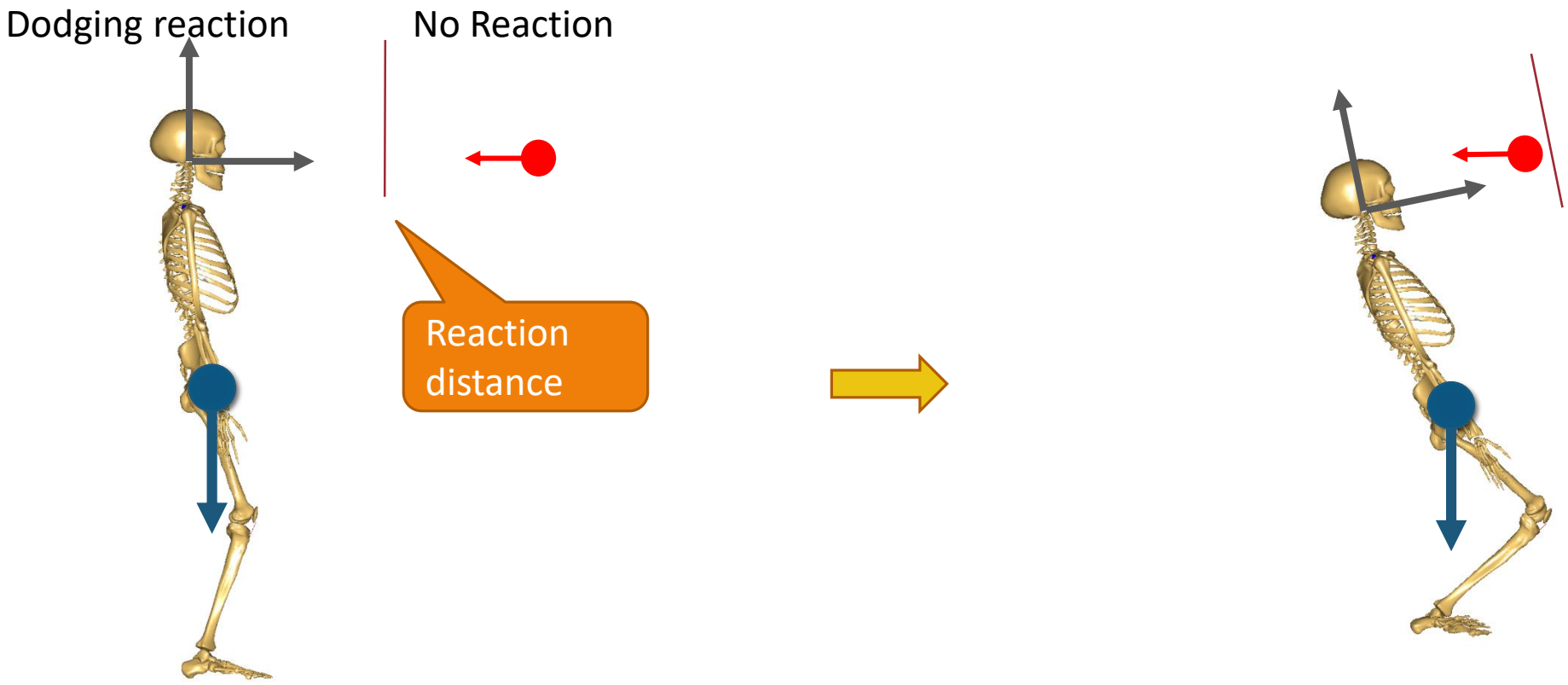
AnyKinMeasureFunComb1

- New class: `AnyKinMeasureFunComb1`
  - Combines a *kinematic measure* with a *function*

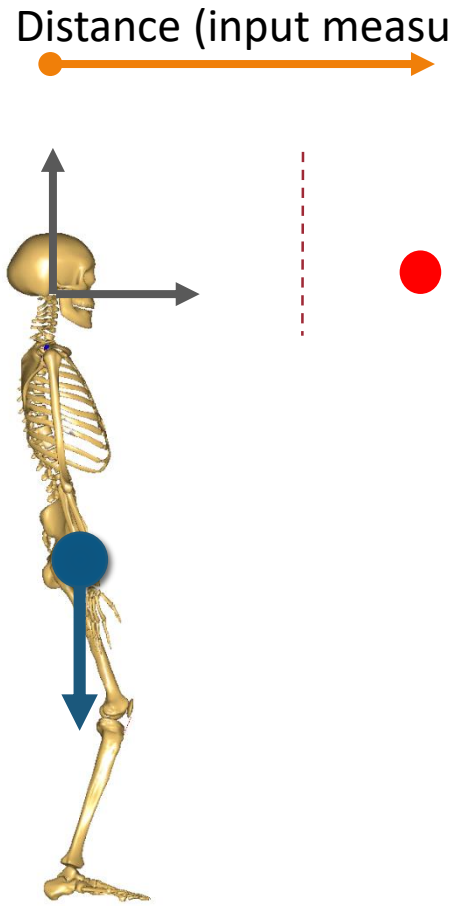


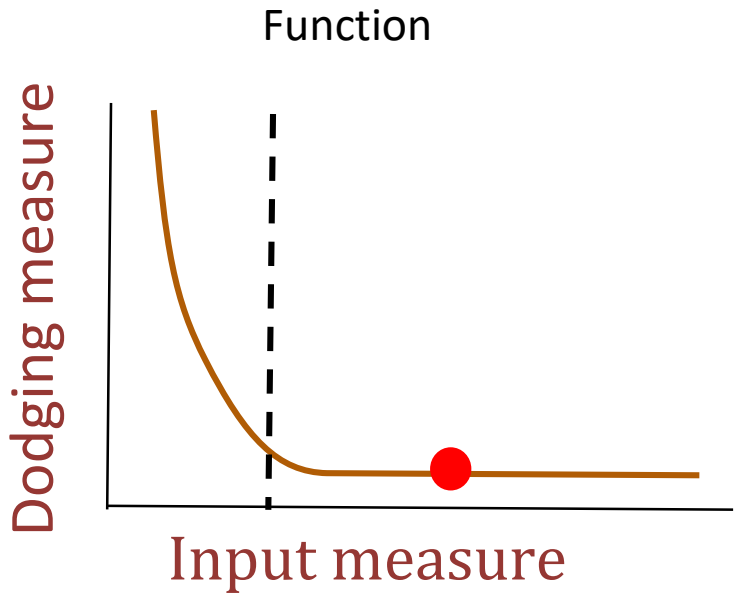
AnyKinMeasureFunComb1

- So what can it be used for?



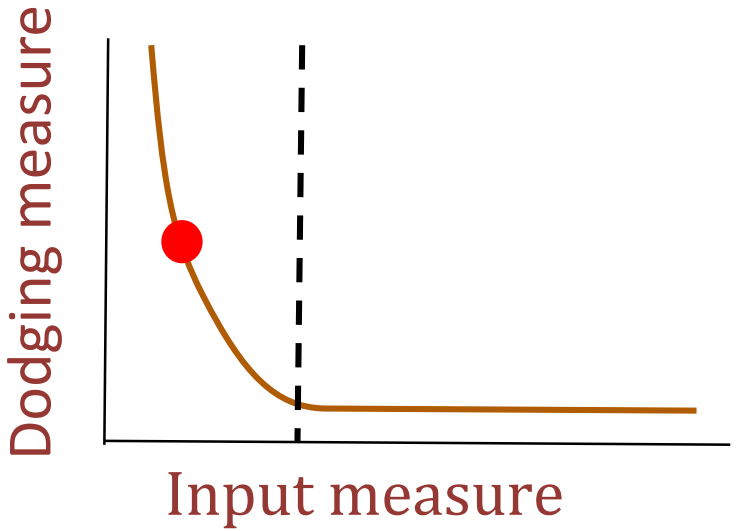
AnyKinMeasureFunComb1



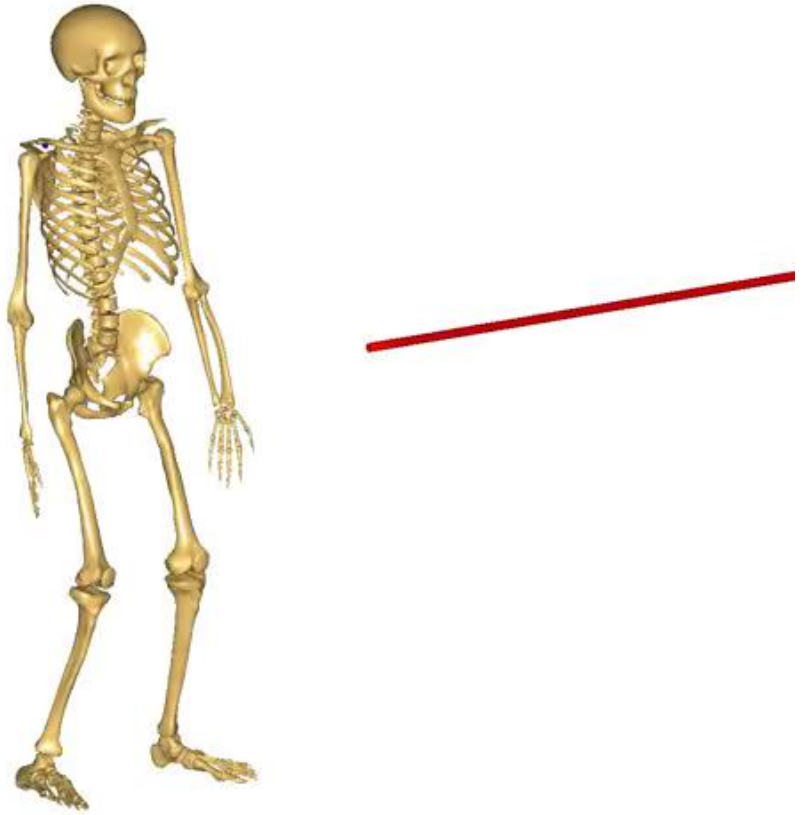


AnyKinMeasureFunComb1

The dodging measure is driven to zero.



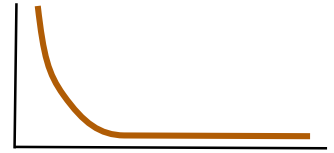
AnyKinMeasureFunComb1



Advanced Kinematics

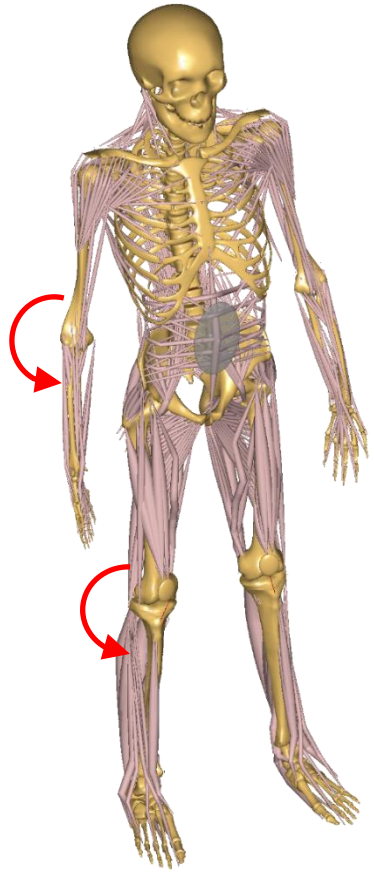
- New class: AnyKinMeasureFunComb1
  - Transformation of existing kinematic measures
  - Create new non-linear measures

```
AnyKinMeasureFunComb1 <ObjectName> =
{
   AnyKinMeasure& ref = .SomeMeasure;
   Functions = {&.Some.Any.Function};
};
```



AnyFunInterpol

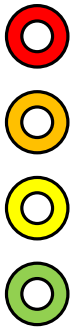
AnyKinRotational
AnyKinLinear



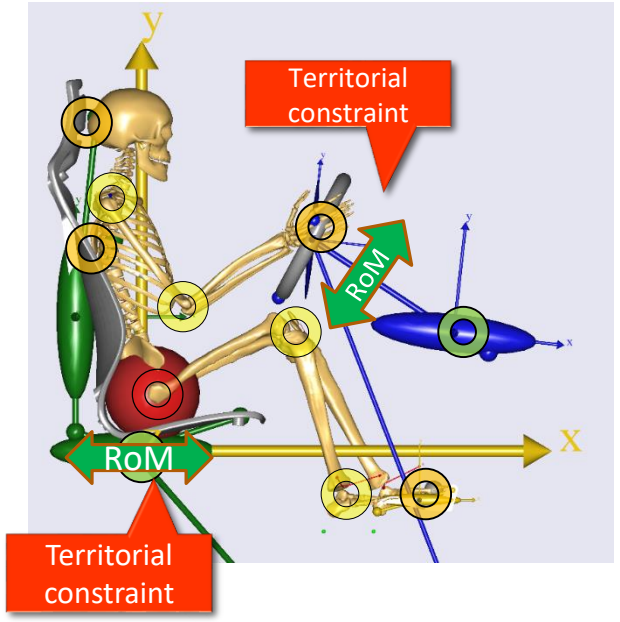
E.g. Implement constraint on joint limits.

Kinematic limits (Territorial constraints)

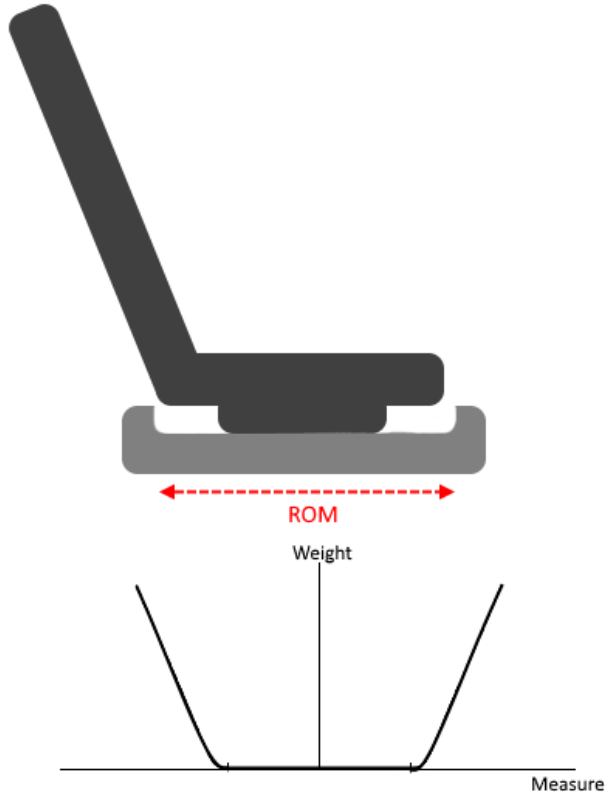
Hard constraint



Soft constraint



The model will find the position within the Territorial constraints that matches all other constraints the best.



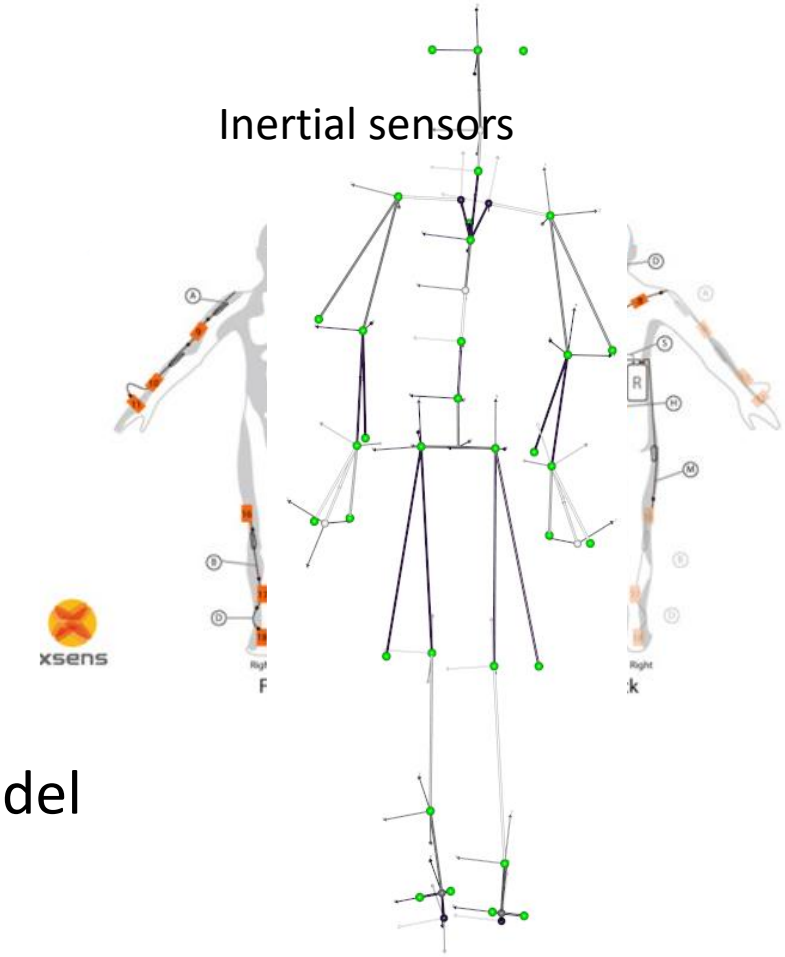
The weight of the constraint will rise when the measure approaches the limits of the measures range of motion

Example: Inertial driven models

3D motion capture without the lab

- Updated AnyScript class: **AnyInputBVH**
  - Robust initial position of the stick-figure
  - Fixed bug with Euler angle discontinuities

```
AnyInputBVH BVH_Input =
{
  FileName = "my_bvh_file.bvh";
};
```



Creates a driven kinematic stick-figure model

Only part of the story

- New application example...

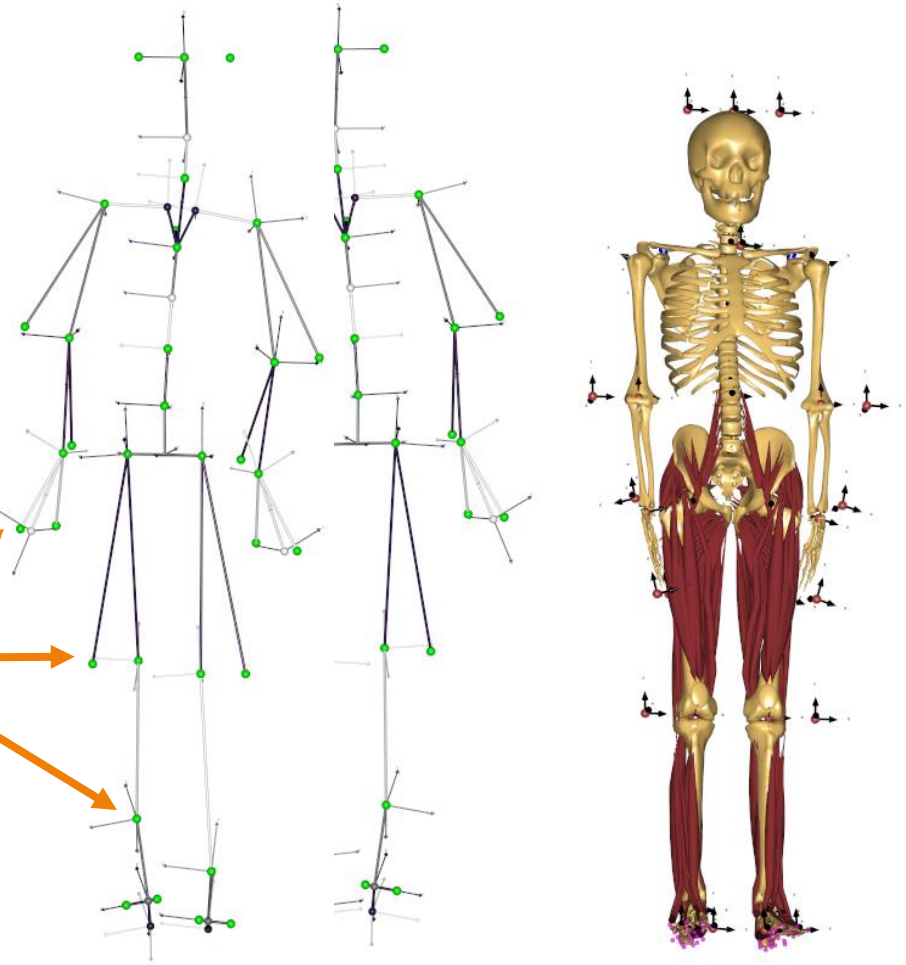
Stick figure from BVH file

Create marker trajectories

Over determined kinematic analysis

Inverse dynamic anlysis & Ground reaction force prediction

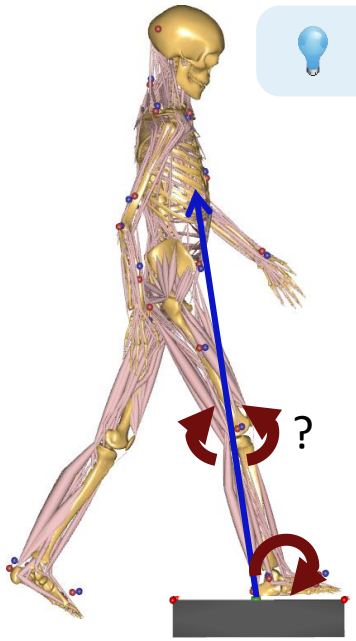
Virtual markers



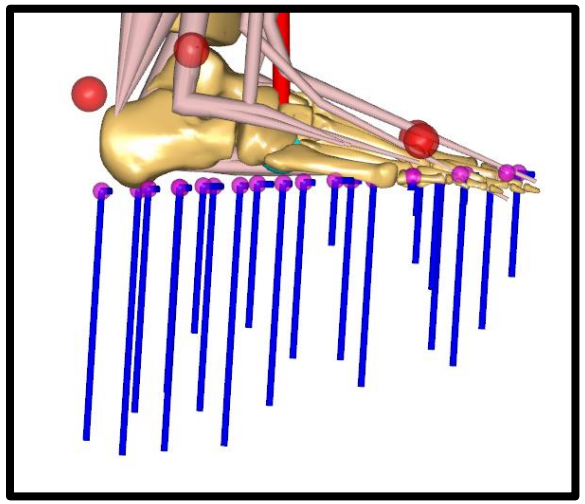
Prediction of ground reaction forces

- Boundary conditions are necessary for inverse dynamic analysis.
  - Usually from force-plates.

Solution: Ground reaction force prediction



Note: See the webcast on GRF prediction.

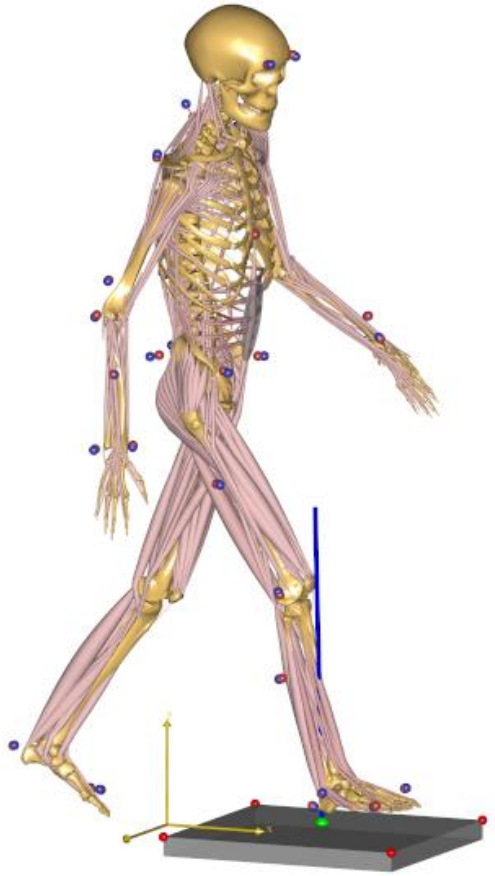


New Framework for MoCap models

ANYSCRIPT language improvements

- Class template system
- AnyScript parser
- AnyInputFile
- AnyMechObjectExclude
- New model view features

→ New improved MoCap framework



` Existing MoCap examples are difficult…

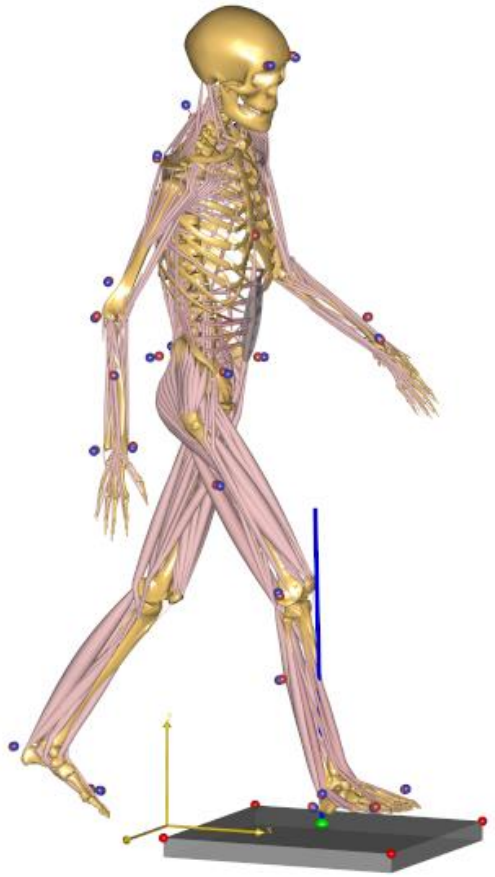
New Framework for MoCap models

Makes MoCap models much simpler

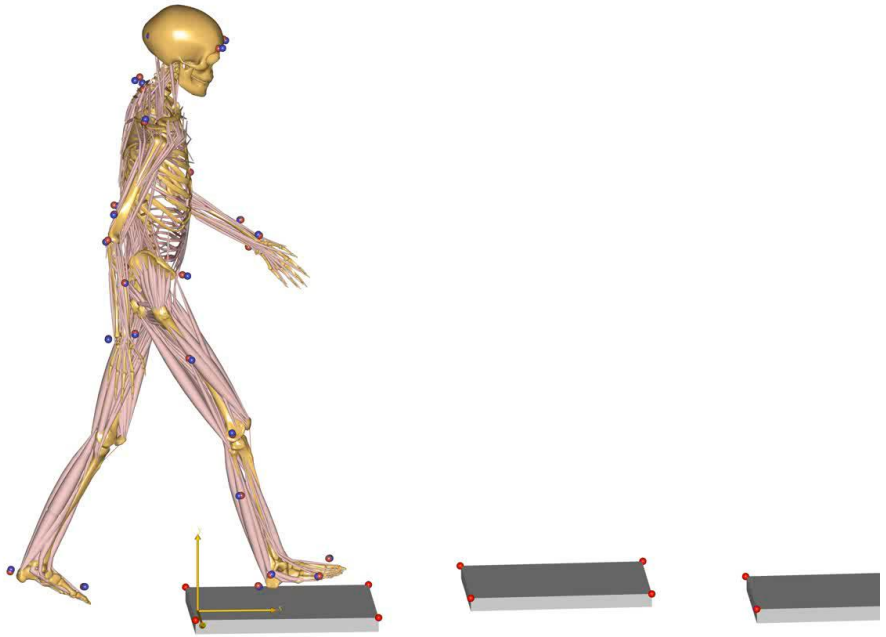
Released early as beta application

- Involve early adopters in the development
- Will eventually get into next AMMR release

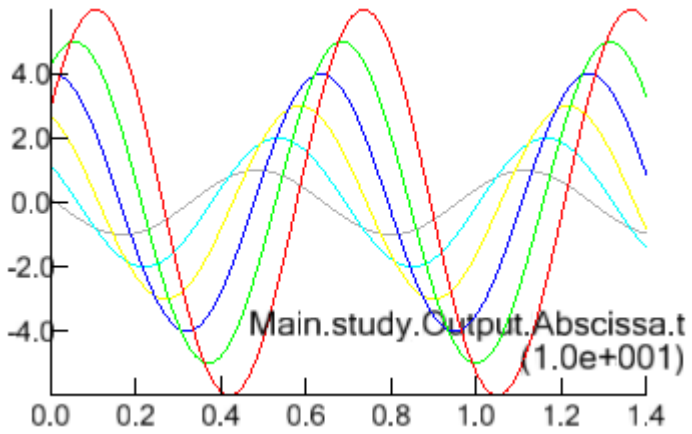
💡 **Get it here:** http://github.com/anybody/anymocap

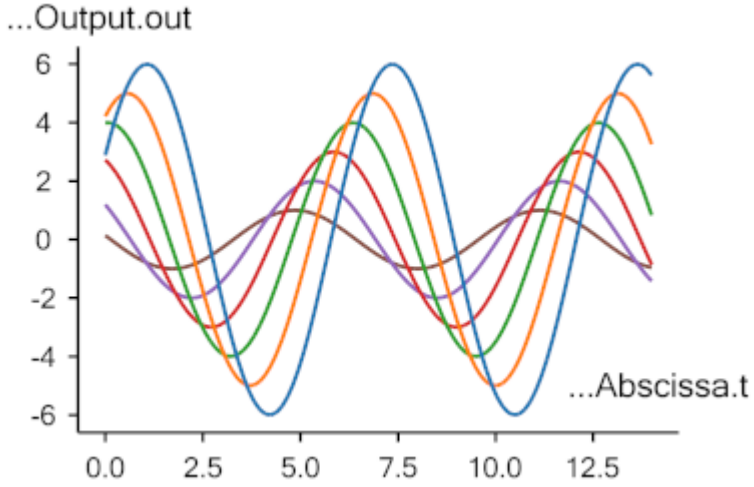


AnyMocap

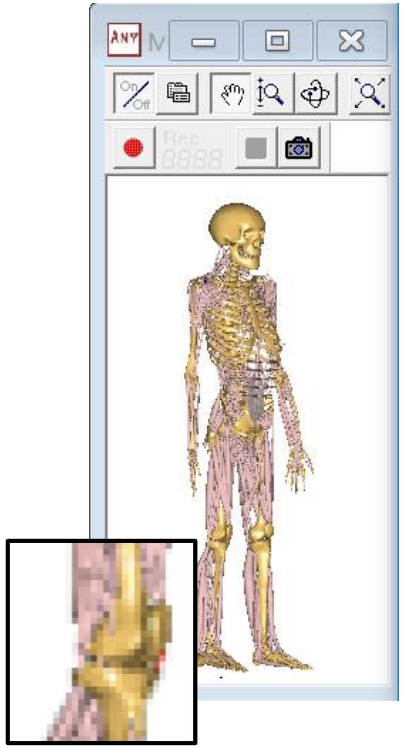


Graphical improvements

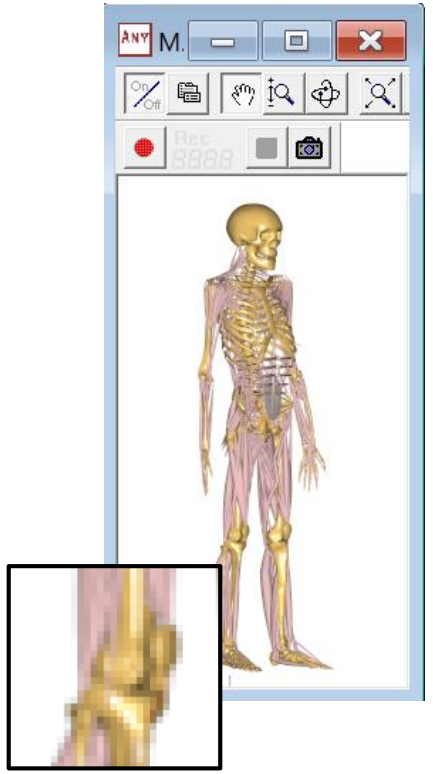




Before



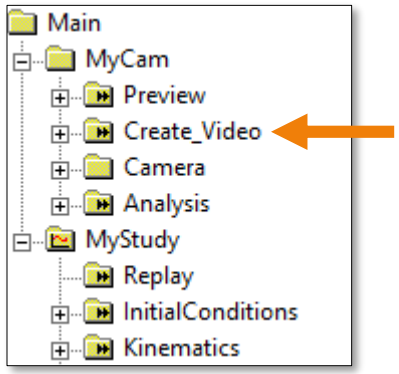
After



Example: Camera plug-in

Have you tried to make video of your simulations?

- A new model plug-in to create videos



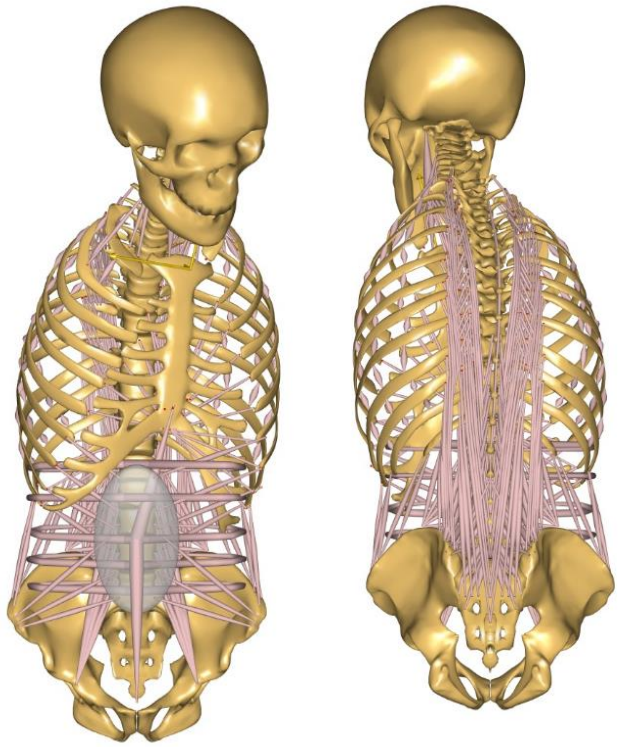
Single Click to:

1. Run the analysis
2. Save all frames as images
3. Convert them to a video
4. Cleans up images
5. Play the video.

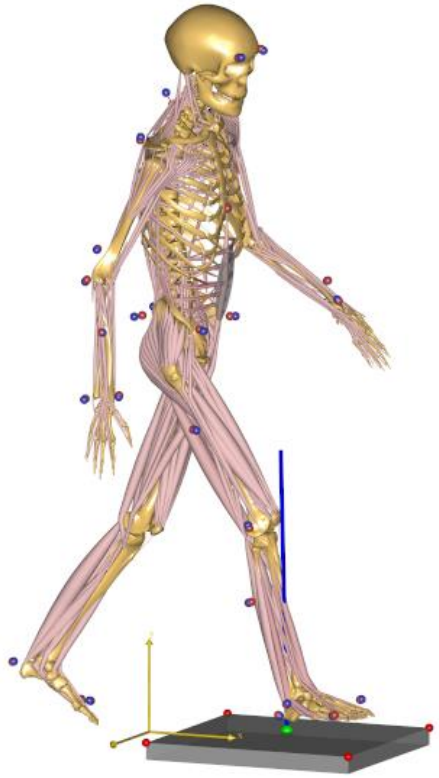
```
#include "CameraClassTemplate.any"

...

VideoLookAtCamera VideoMaker(UP_DIRECTION=y) =
{
  LookPoint2Camera_direction = {1, 1, -1};

  LookAtPoint = {0, 0, 1.3};

  Analysis = {
    AnyOperation &ref = Main.MyStudy.Kinematics;
  };
};
```

What can you expect in 2017?

- **New model repository**
  - New Lower limb model TLEM2.0
  - New thoracic model
  - Updated lumber spine and pelvis
  - Many new application examples



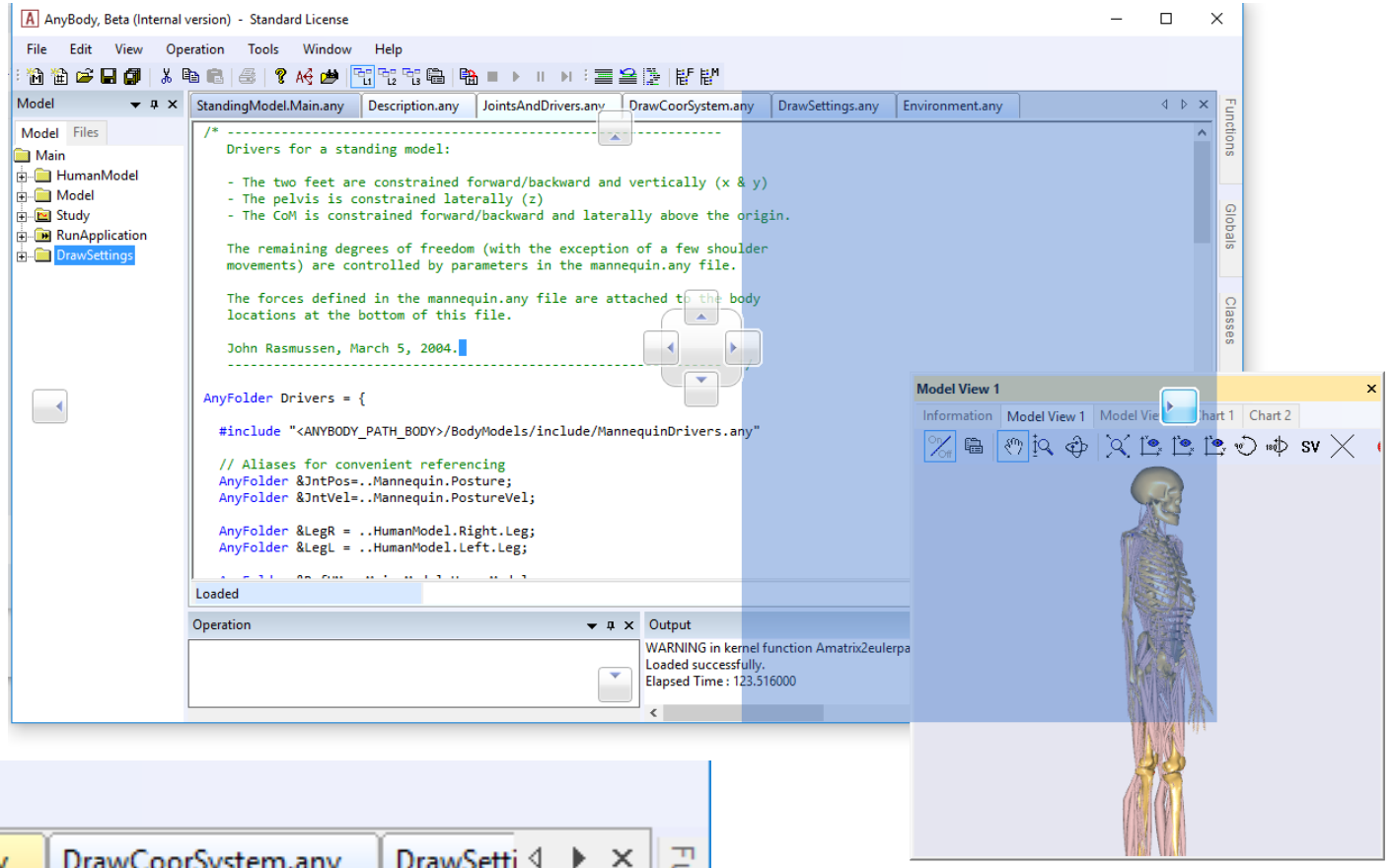
New thoracic model

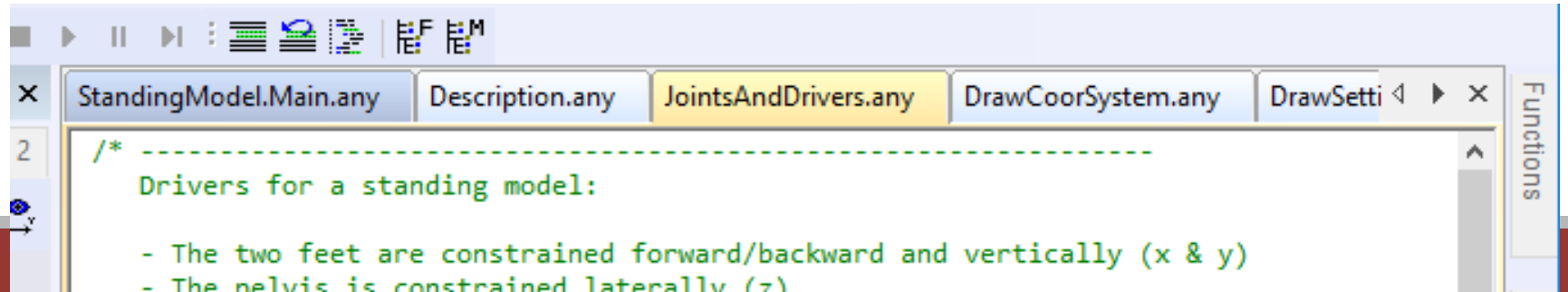


Twente Lower Extremity Model 2.0

What can you expect in 2017?

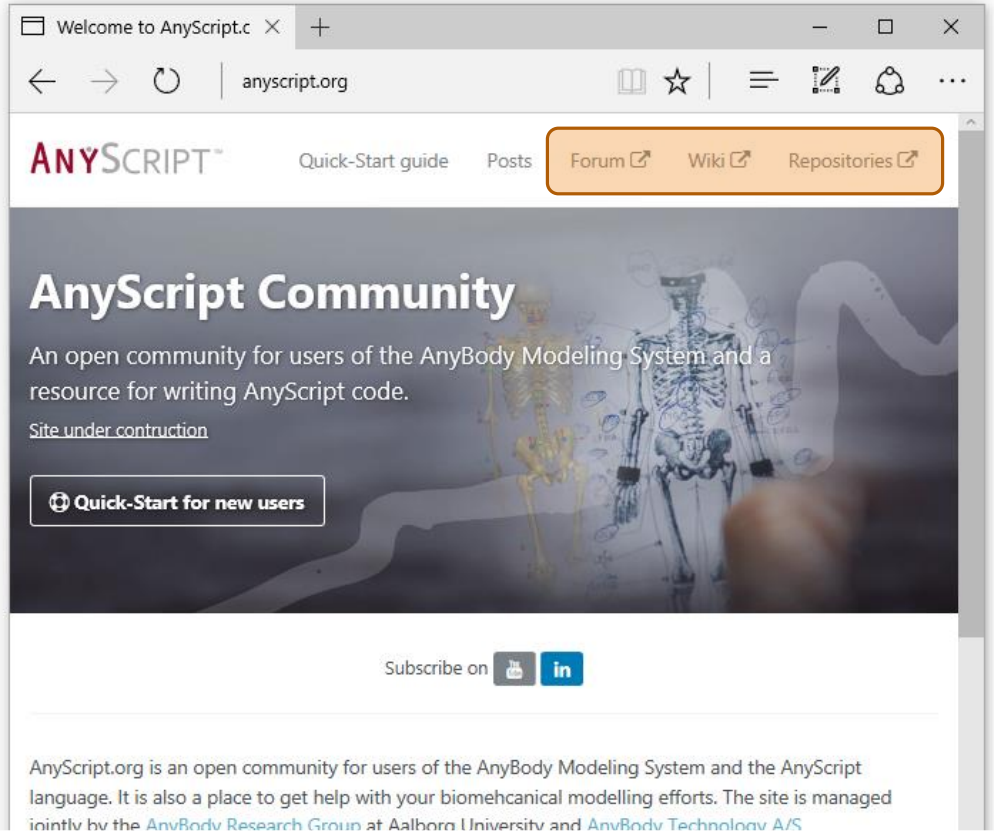
- **AnyBody Modeling System 7.0**
  - New GUI system
  - Tabbed editor
  - More chart improvments
  - New kinematic solvers
  - Plugin system (Using Python)
  - Software development kit





AnyScript.org

- Community site for Users and developers.
- Will have posts on:
  - Tips&Tricks for AnyScript
  - New models available
- Links to:
  - Forum
  - Wiki site (new)
  - Repositories (new)



Repository sharing

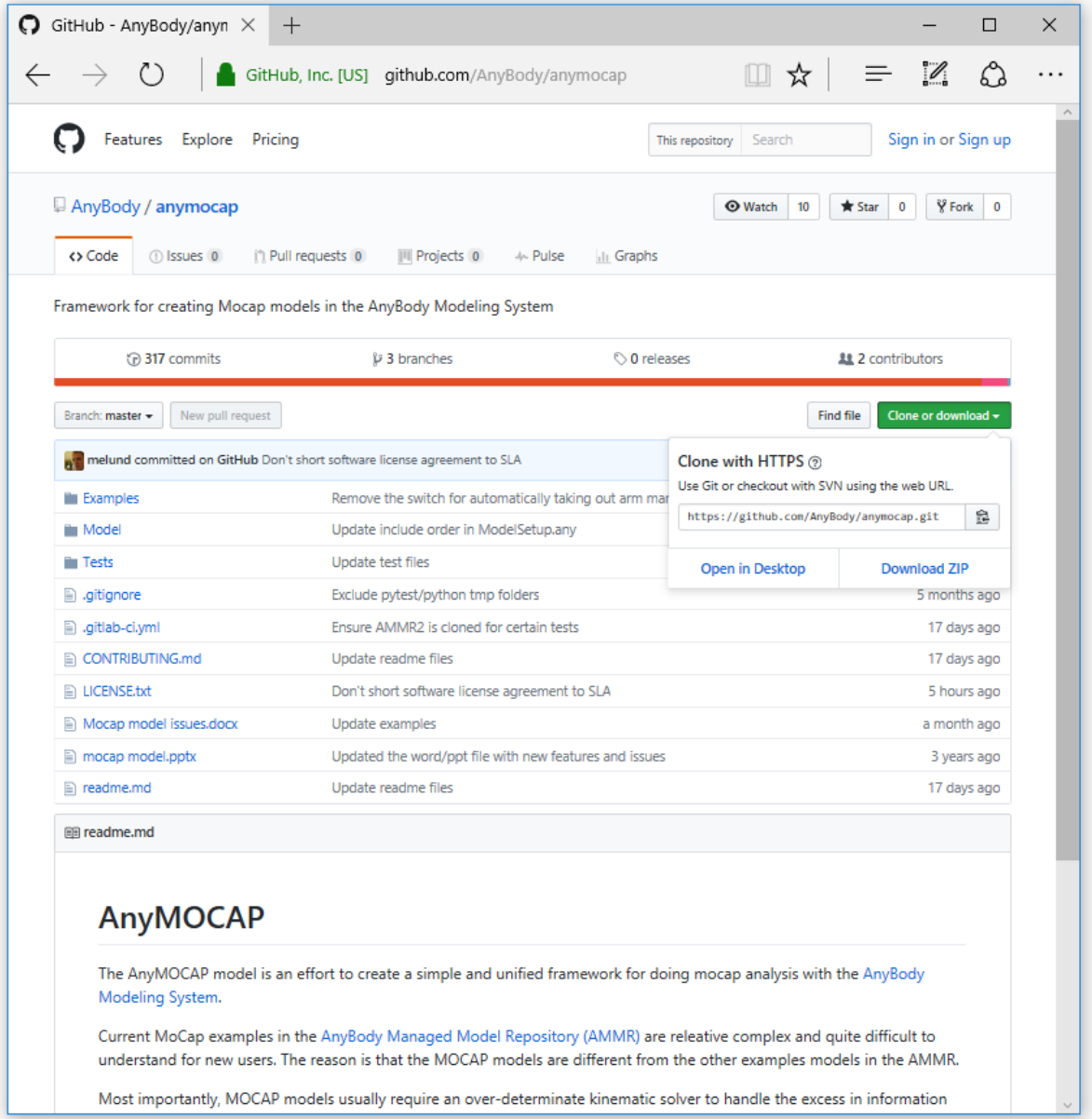
Online project hosting:

- GitHub. The biggest software development platform
- Version controlled repositories, issue tracking etc.

http://github.com/AnyBody

- Download:
  - The examples models
  - New AnyMocap framework

-> and join the development



Previous webcasts

- Check our YouTube channel

www.anybodytech.com

- Events, dates, publication list, ...

www.anyscript.org

- Wiki, Forum, Repositories

Events:

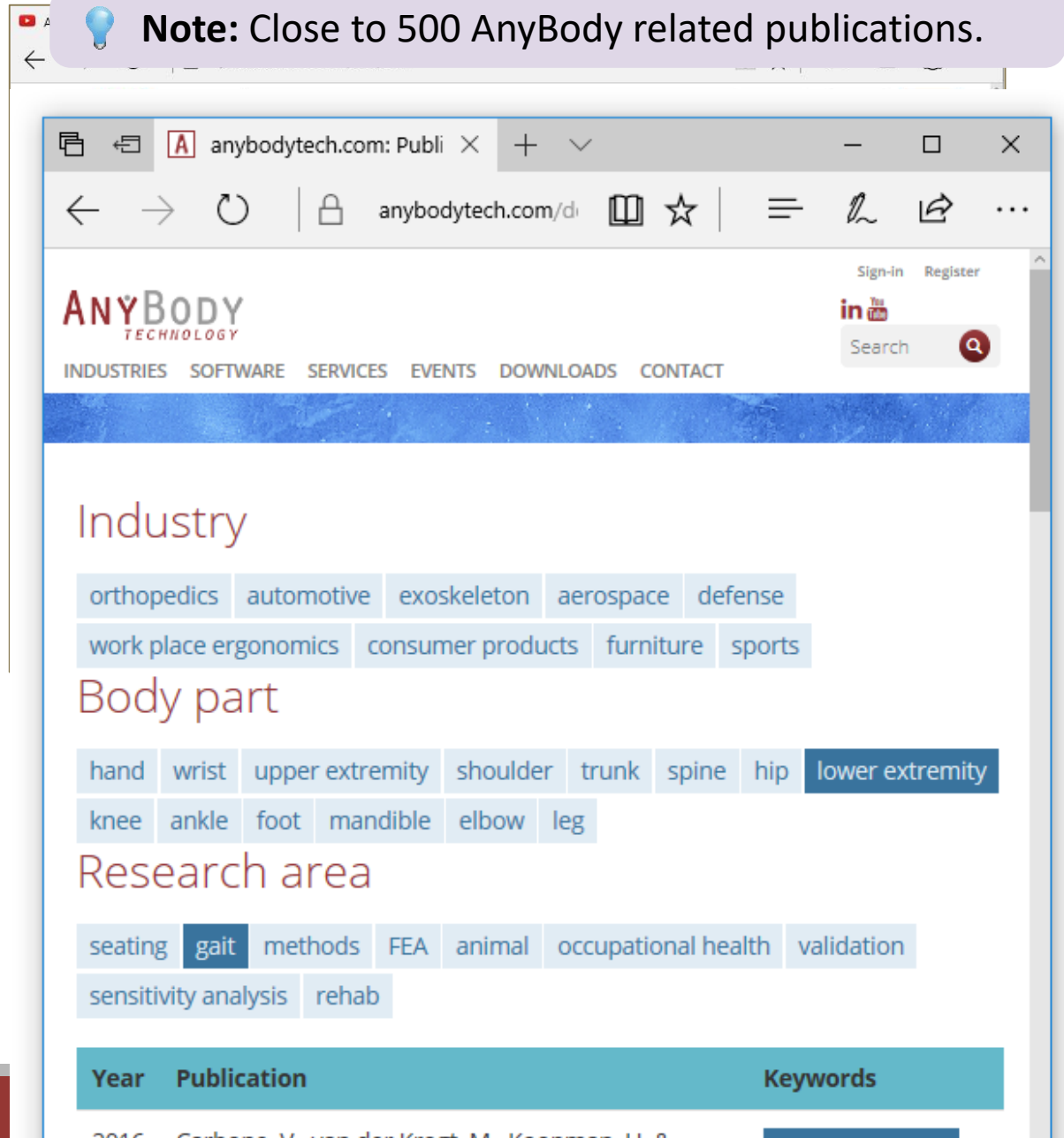
14-18 Mar: AAOS 2017 - San Diego, CA

19-22 Mar: ORS 2017 - San Diego, CA

19 Apr: Experience the AnyBody Spotlight Demo at WearRAcon 17 in Phoenix, AZ

Meet us? Send email to sales@anybodytech.com

Note: Close to 500 AnyBody related publications.



Time for questions: