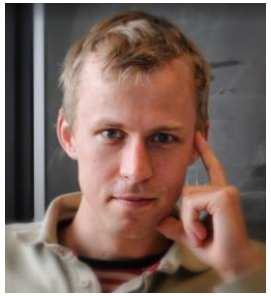
The webcast will start in a few minutes….

How to batch process

YOUR ANYBODY MODELS

Outline

- Introduction by the Host
- Batch Process AnyBody Models
  - Intro to the AnyBody macro language
  - Running models from Python
  - Create a simple Batch process setup
  - Example from LifeLongJoint project.
- Final words from the host
- Questions and answers



Morten Enemark Lund
R&D Engineer, AnyBodyTech
(Presenter)

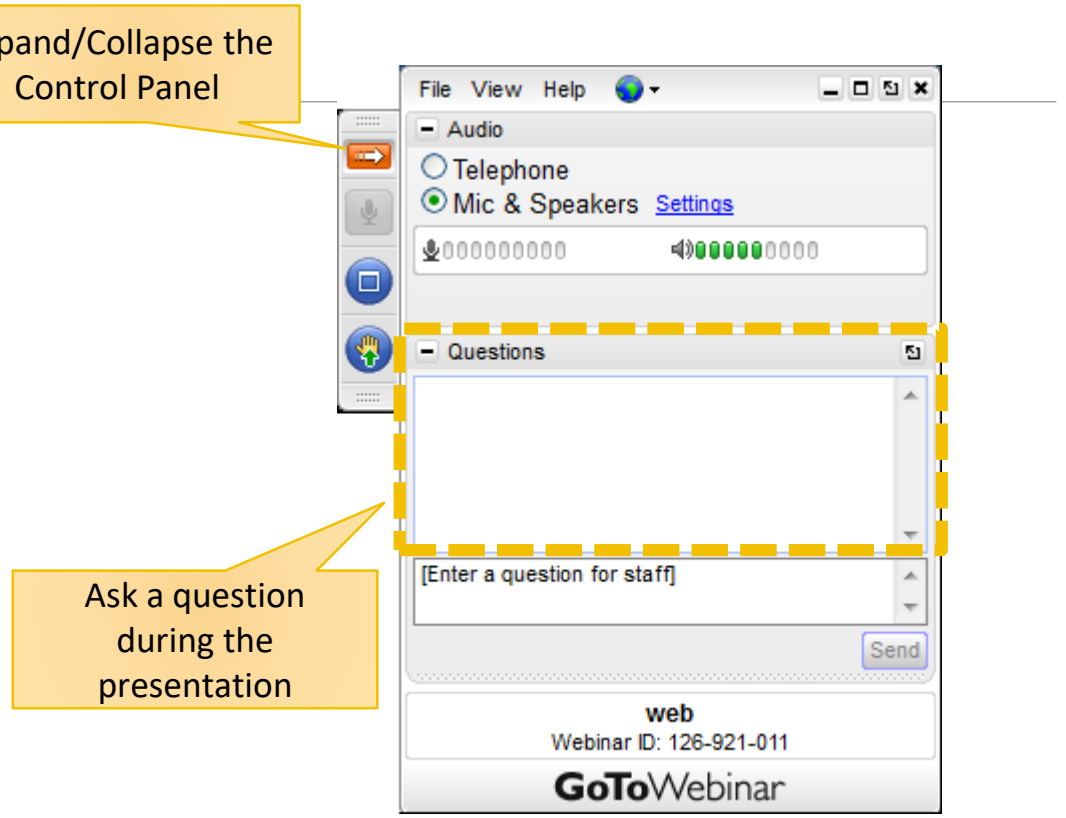
Mohammad S. Shourijeh
R&D Engineer, AnyBodyTech
(Host)

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.



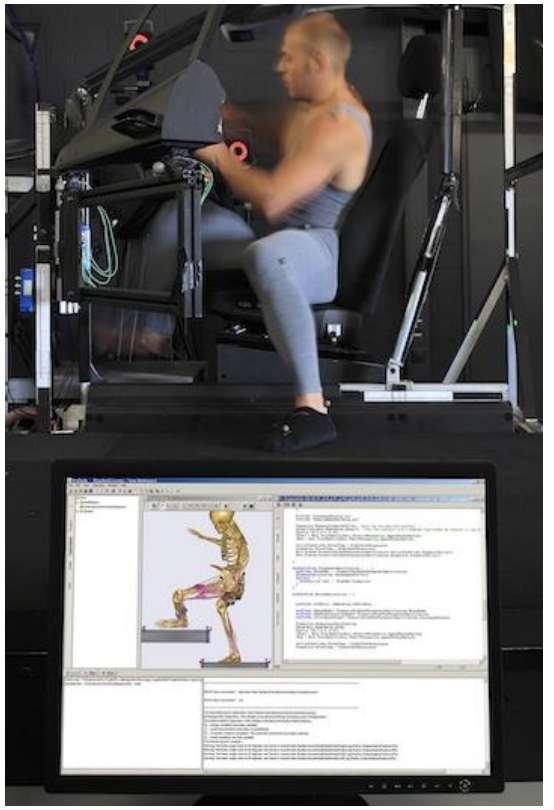
AnyBody Modelling System

Musculoskeletal analysis

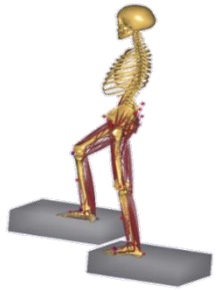
AnyBody Managed Model Repository

Wide range of simulation options

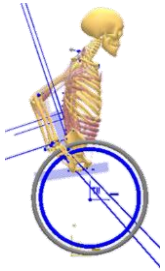
- Motion capture
- Ground reaction force prediction
- Imaging → Patient-specific anatomy
- Man-machine simulations



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



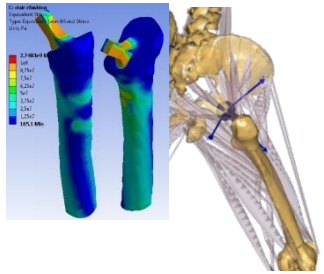
Movement Analysis



Product Design Optimization

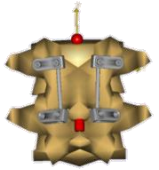
AnyBody Modeling System

Ergonomic Analysis



Load Cases for Finite Element Analysis

Surgical Planning and Outcome Evaluation

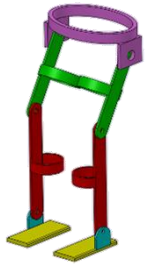


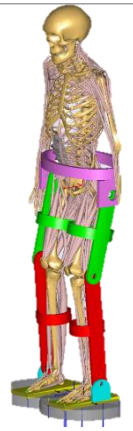
AnyBody Modelling System

Motion and Forces

Body model

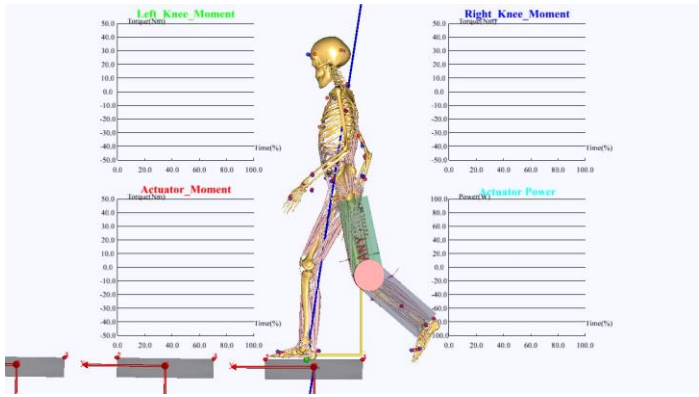
Environment model





Inverse dynamics
Muscle recruitment

Simulation



Internal body loads

- Muscle forces
- Joint forces

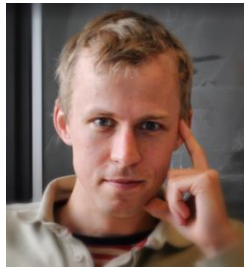
Design Optimization

Post Processing (e.g. FE tools)

How to batch process

YOUR ANYBODY MODELS

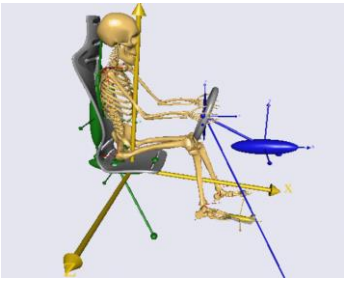
Morten Enemark Lund
R&D Engineer
AnyBody Technology



Why automate your simulations?

- Best argument is *Reproducibility*
- Explore the effect of different inputs
- Batch process many models

16000 simulations



Simulation of Automotive Ergonomics based on Population specific Anthropometrics.
Kasper Pihl Rasmussen,
John Rasmussen
Aalborg University

Model example for this webcast

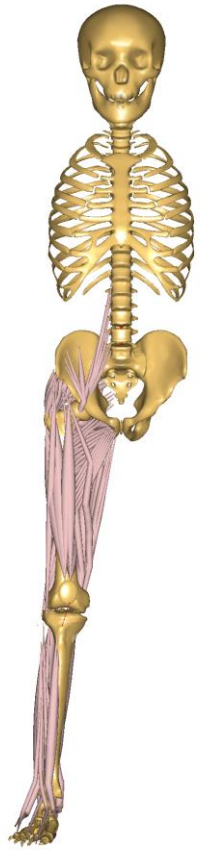
- A simple model to calculate the moment arms for the hip

C:\how-to-batch-process-anybody-models\macro examples\hip.any - Not Loaded

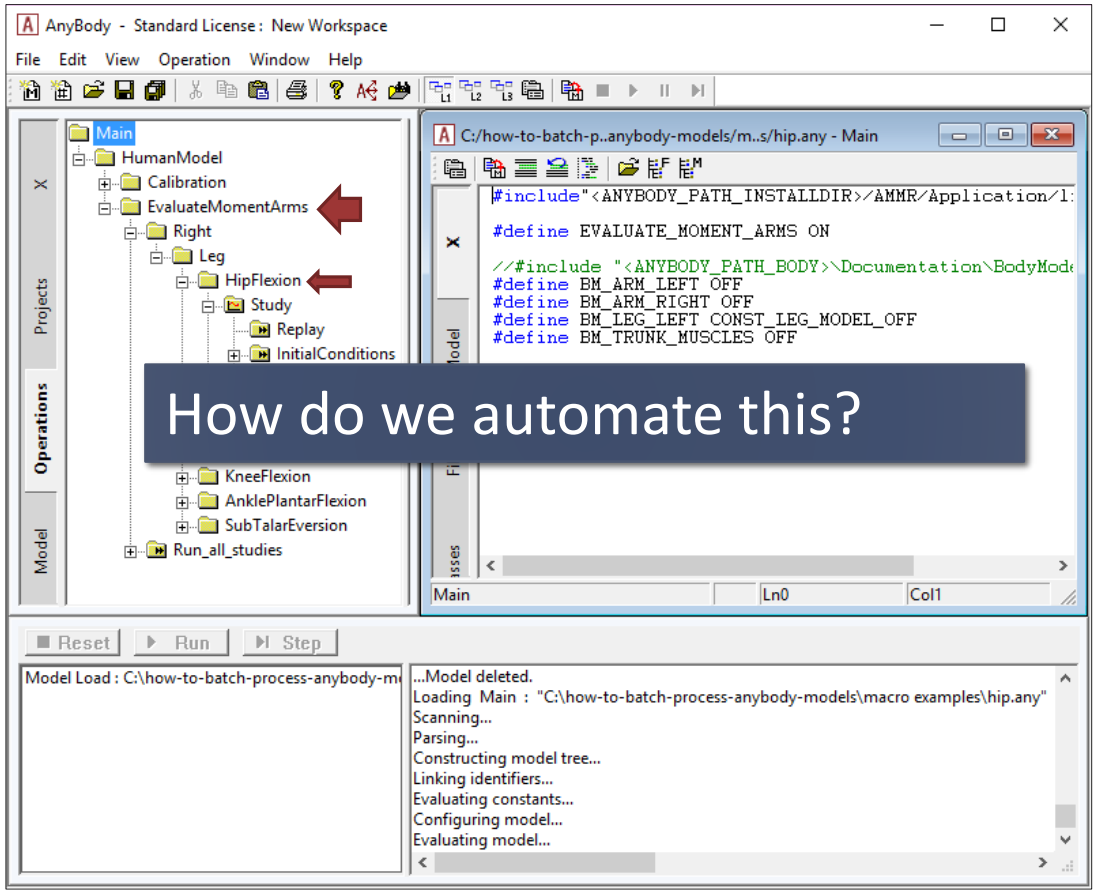
```
#include"<ANYBODY_PATH_INSTALLDIR>/AMMR/Application/libdef.any"

#define EVALUATE_MOMENT_ARMS ON
#define BM_ARM_LEFT OFF
#define BM_ARM_RIGHT OFF
#define BM_LEG_LEFT CONST_LEG_MODEL_OFF
#define BM_TRUNK_MUSCLES OFF
Main =
{
    #include "<ANYBODY_PATH_BODY>\HumanModel.any"
};
```

Model | Files

Not Loaded | Ln0 | Col1



Model example for this webcast

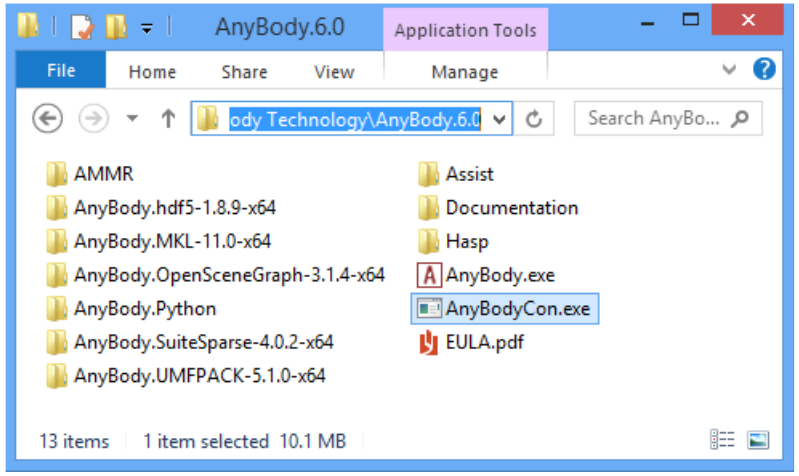


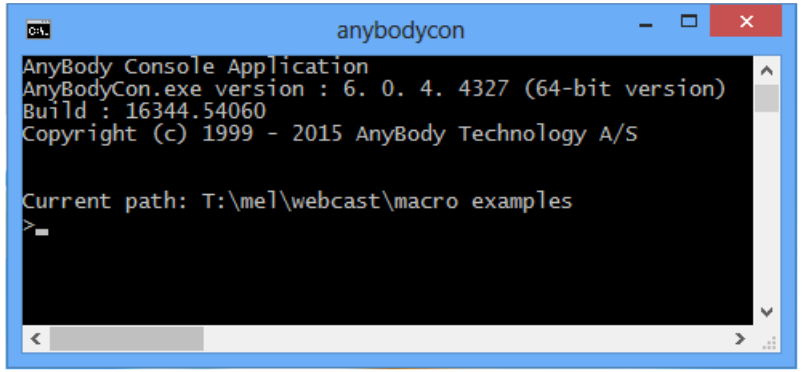
The console application

The AnyBody Modeling System without the graphical user interface (GUI)

Accepts macro commands:

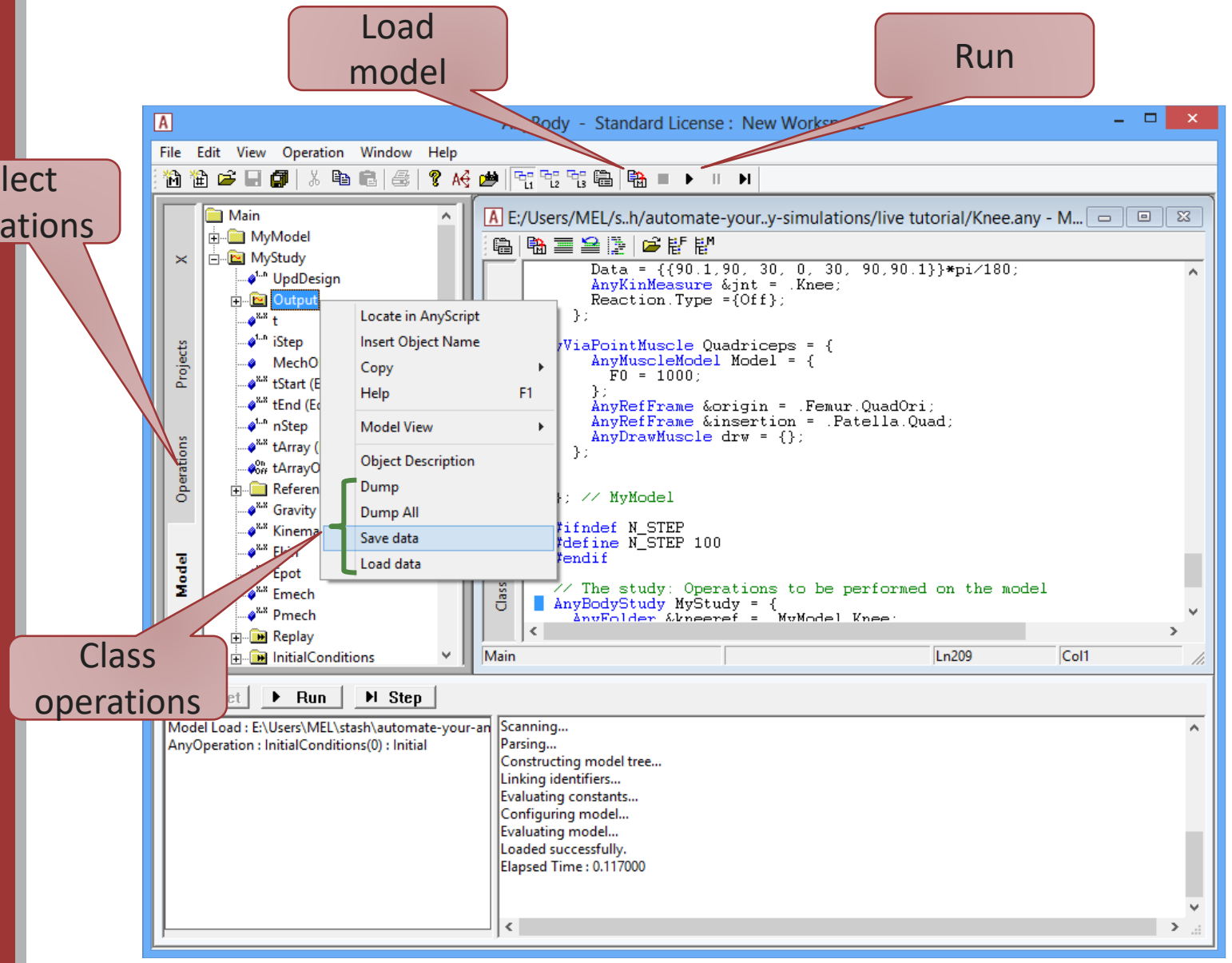
```
load "filename.any"  [arguments]
   Arguments:
    -def <identifier>=<value>
    -p <path-identifier>=<dir-path>
```



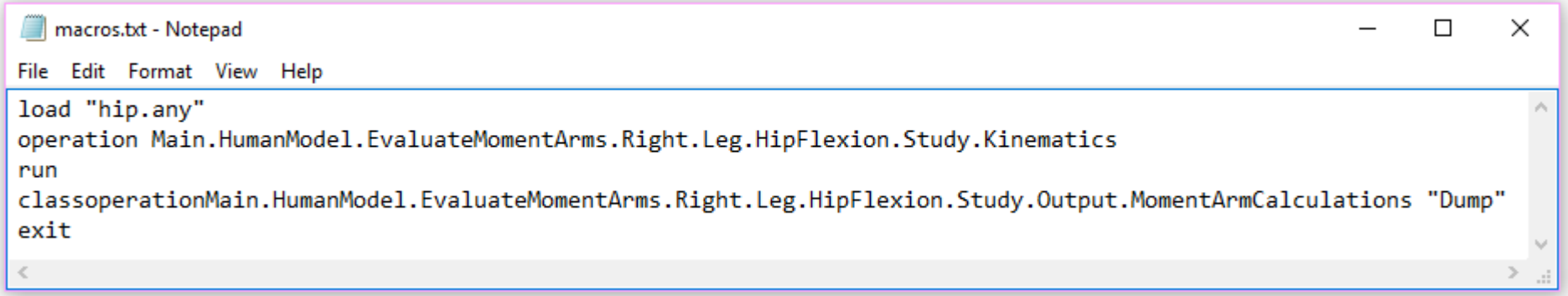


AnyScript Macros

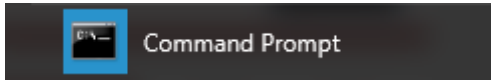
- `load <"file name"> [arg]`
- `operation <opr_name>`
- `run`
- `classoperation <obj> <cmd> [arg]`
- `exit`



Creating a macro file



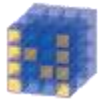
Launch the AnyBodyCon.exe with the file



Running Anybody from Python

python™ Modern object oriented language
Quick and easy to learn

Large ecosystem of libraries for math, science and engineering



NumPy
N-dimensional arrays

SciPy
Library of scientific functions

Matplotlib
Plotting library

IP[y] IPython
Iteractive computing

Many more…

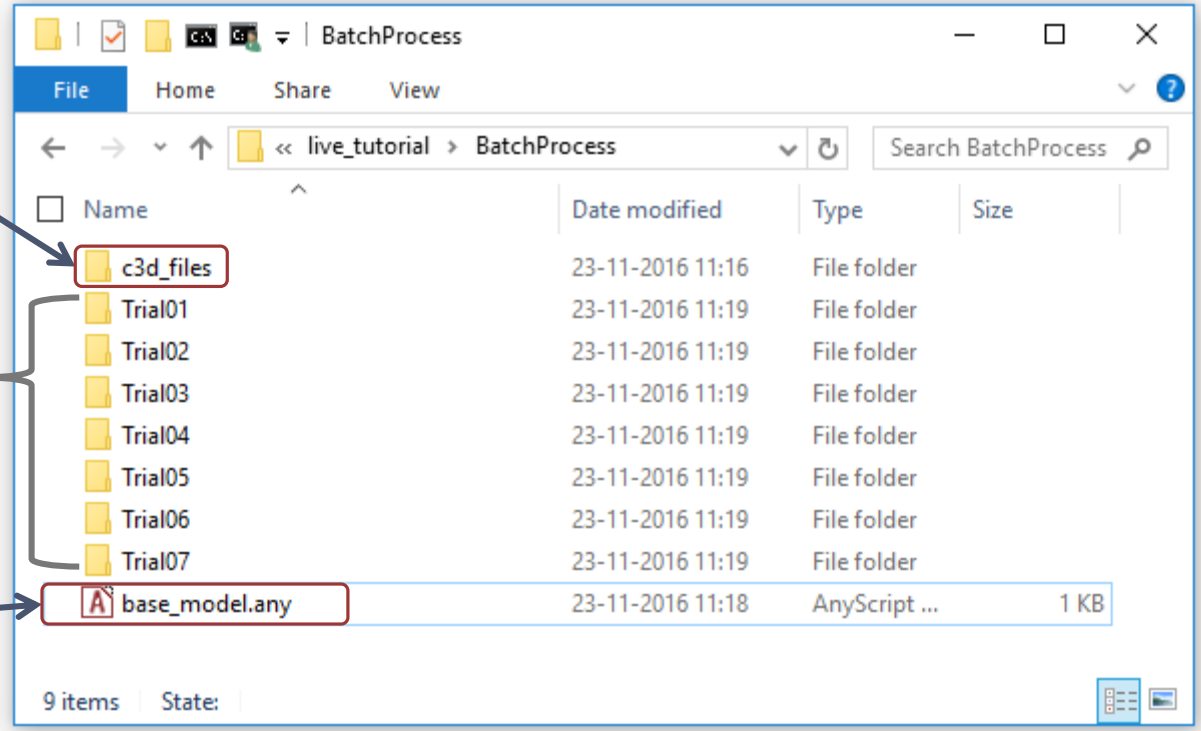
Next: Live Examples

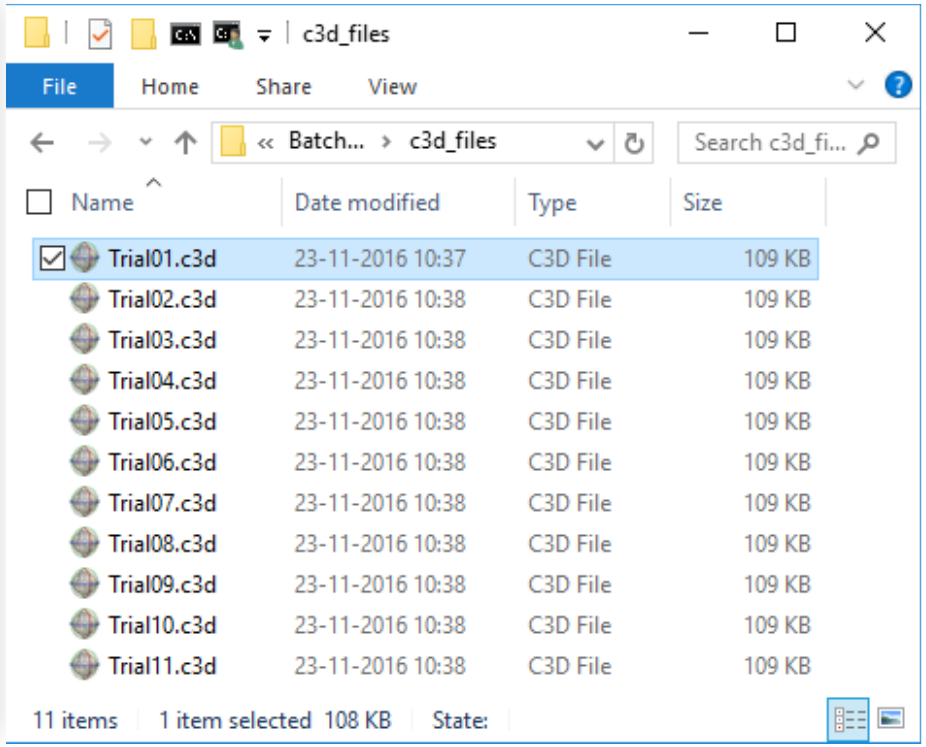
Basic example with multiple main files

All input data in one folder

Every trial in their own folder

One common base model





Basic example with multiple main files

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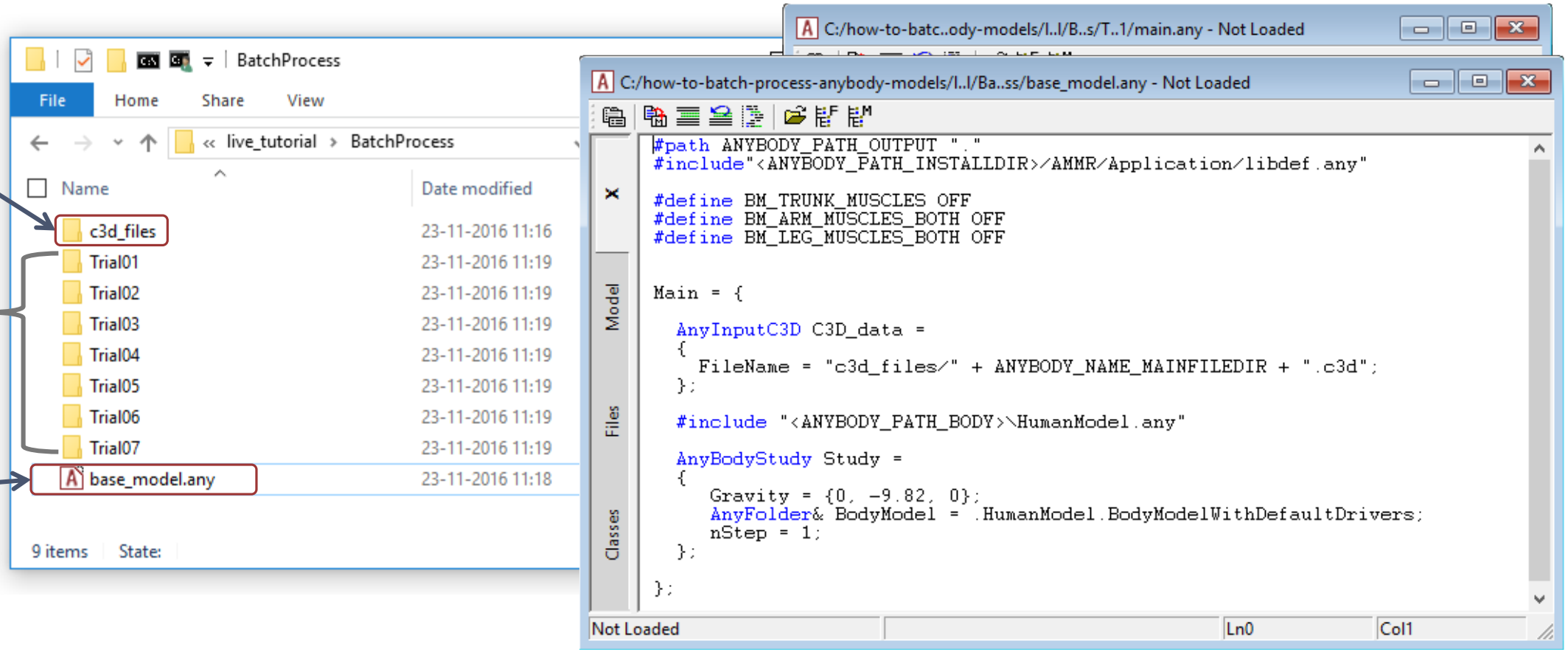
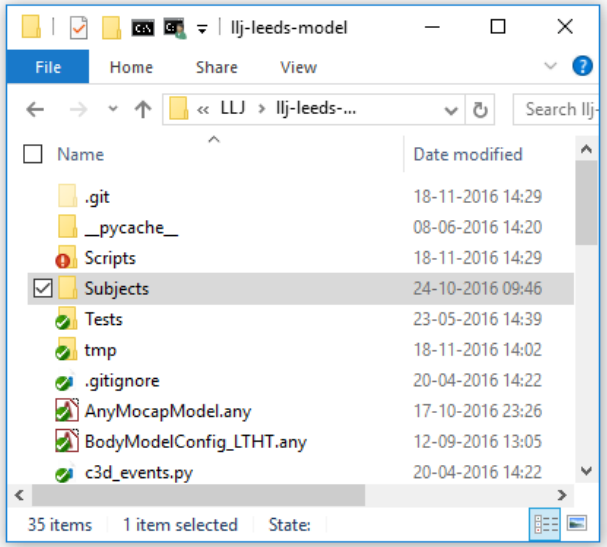


Real life example

LifeLongJoints Framework 7 EU project
http://lifelongjoints.eu

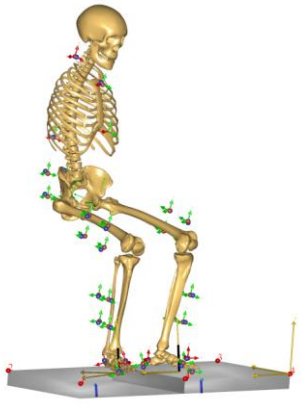
MoCap based model of hip patient.
Activities of daily living.



DATA SET The Leeds Teaching Hospitals NHS
NHS Trust

Collected at 'Leeds Teaching Hospital NHS Trust'

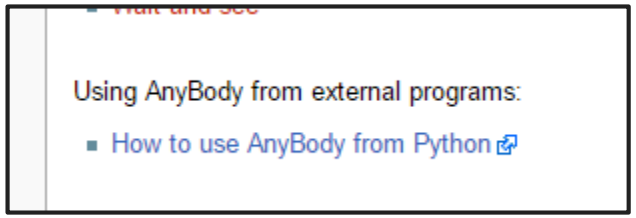
- 152 hip patients
- > 2000 trials



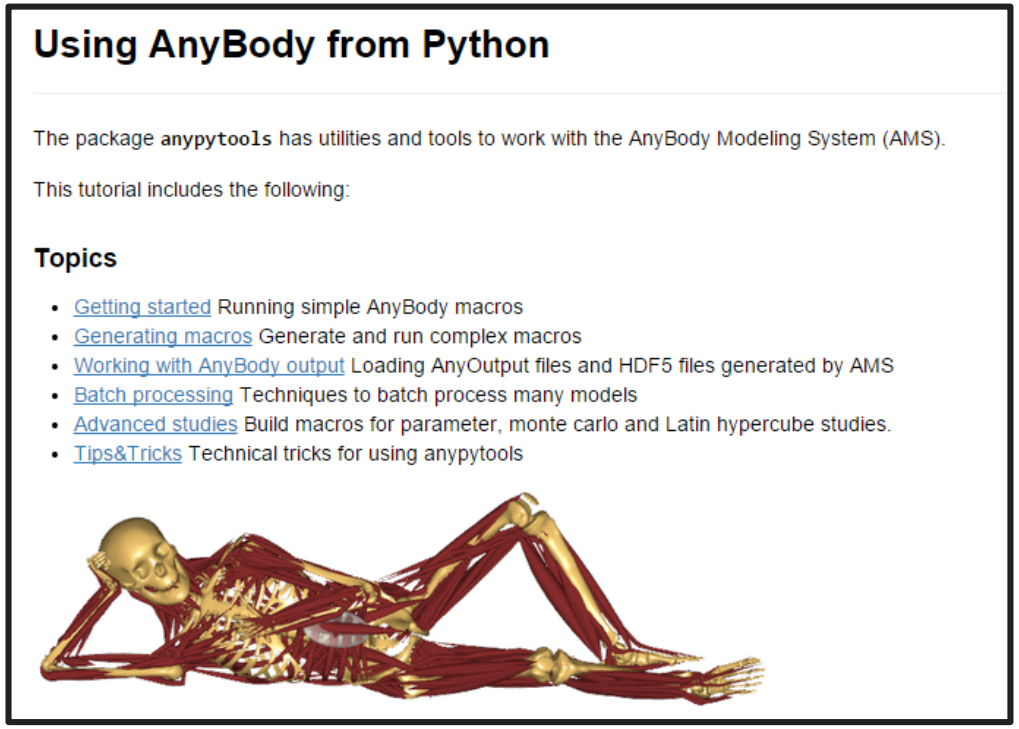
The End

Refer to the AnyPyTools tutorial.

- A HTML version on http://wiki.anyscript.org



- Interactive version is installed with AnyPyTools. (In the windows start menu)



Email to:
mel@anybodytech.com

inquiry@anybodytech.com

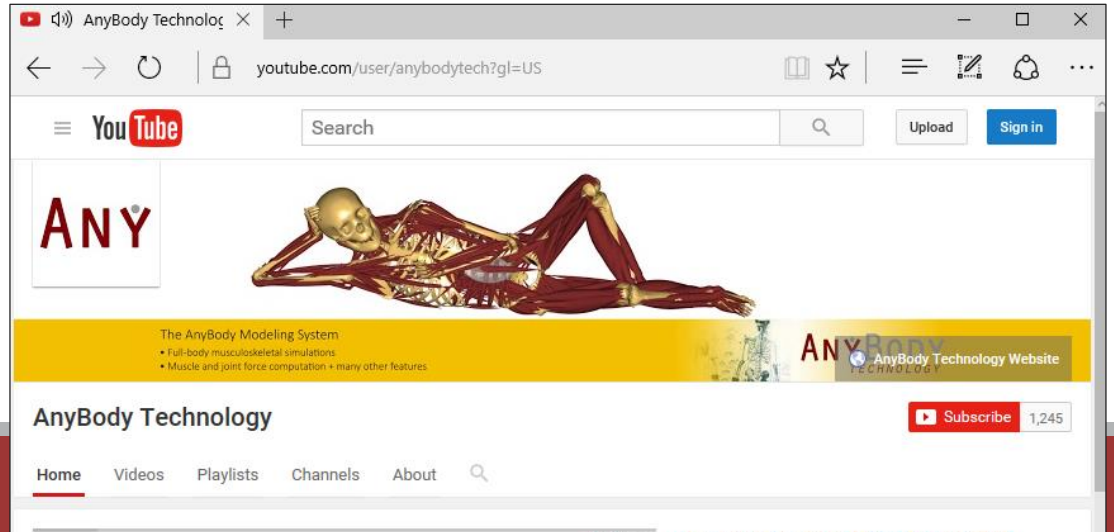
Upcoming Webcasts:

- Musculoskeletal modeling of Dragonflies
  - Sina David (Institute of Biomechanics and Orthopaedics, German Sport University Cologne)
  - Dr. Alexander Blanke (University of Hull, Department of Mechanical Engineering)

Events:

- PhD Course: Predictive Musculoskeletal Modelling
  - At Aalborg University, Denmark
  - 27th to 31st of March 2017
  - Sign-up open from the 28th of November 2016.
  - **Find registration link on www.anybodytech.com**

Check previous webcasts on: http://youtube.com/anybodytech



www.anybodytech.com

- Events, dates, publication list, ...

www.anyscript.org

- Wiki, Forum

Time for questions:

Email to:
mel@anybodytech.com

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