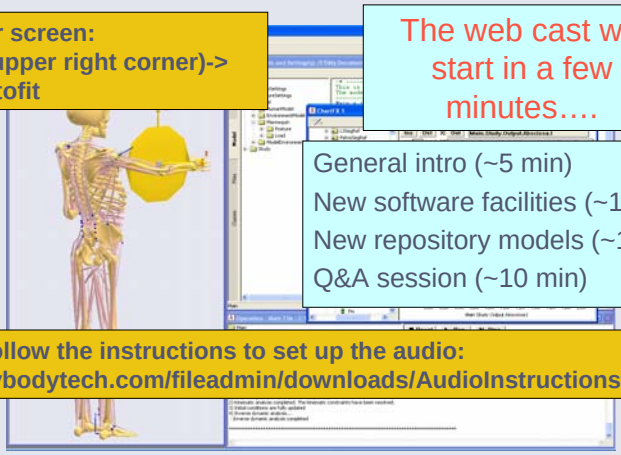
Intro to version 2 of the AnyBody Modeling System

To fit your screen:
Sharing (upper right corner)->
View->Autofit

The web cast will start in a few minutes….



General intro (~5 min)
New software facilities (~15 min)
New repository models (~15 min)
Q&A session (~10 min)

Please follow the instructions to set up the audio:
www.anybodytech.com/fileadmin/downloads/AudioInstructionsWebEx.pdf

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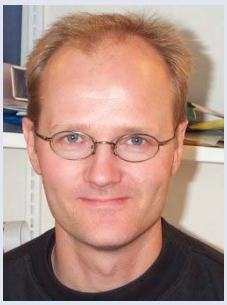
Presenters



John Rasmussen
(Presenter)

Arne Kiis
(Host)

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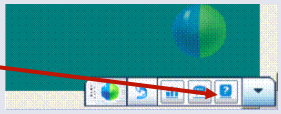
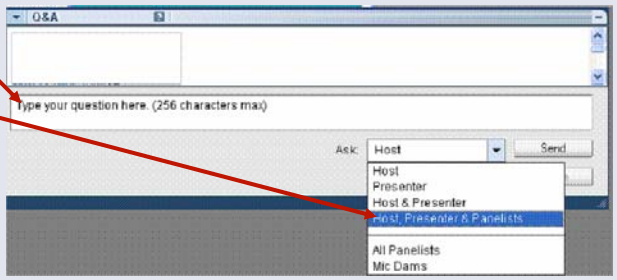
Q&A Panel

- Søren Tørholm
- Launch the Q&A panel here.
- Type your questions in the Q&A panel.
- Send the question to ”Host, Presenter & Panelists”
- Notice the answer displays next to the question in the Q&A box. You may have to scroll up to see it.





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The models are separated from the software

<u>The AnyBody Research Group</u>
- Model development
- Basic methodology
- New applications

Results are public domain
Models are in clear text
www.anybody.aau.dk

<u>AnyBody Technology A/S</u>
- The AnyBody Modeling System
- Training, support and consultancy

Free demo licenses

www.anybodytech.com

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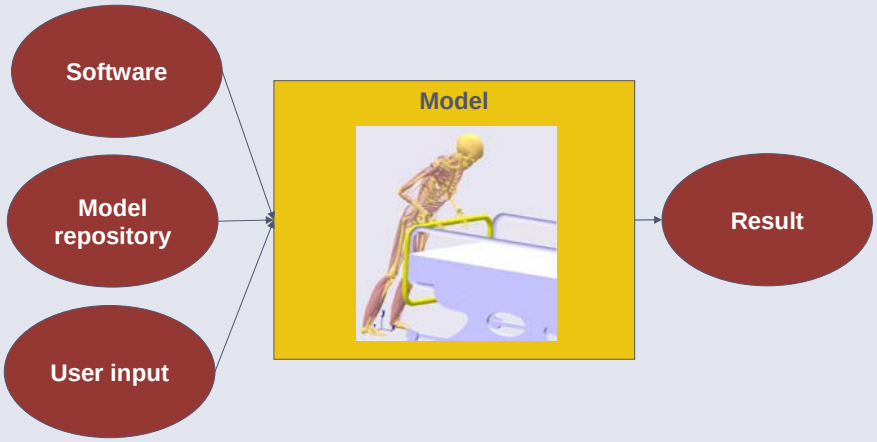
Overall update theme: Improvement of usability



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New software facility: Optimization and parameter studies

- Any parameter in the model can be a design variable.
- The system tracks all dependencies on all variables.
- The system makes sure everything is calculated in the right order.
- Useful for
  - Ergonomic optimization
  - Posture prediction
  - Prediction of movement
  - Design of orthopedic implants.
  - Optimization of muscle mass distribution

```
  //Friction coefficients between the humar
 AnyVar StaticFrictionSeat=0.5;
 AnyVar StaticFrictionBackrest=0.0;
 AnyVar StaticFrictionFootrest=0.5;
 AnyVar StaticFrictionArmrest=0.5;
```

```
// Parameter study for simultaneous variation of seat inc
// and seat friction.
AnyParamStudy ParamStudy = {
  Analysis = {
    AnyOperation &op = ..Study.InverseDynamicAnalysis;
  };
  nStep = {10,10};
  AnyDesVar SeatIncl = {
    Val = Main.DrvPos.SeatGlobalRotZPos;
    Min = Val - 10*pi/160;
    Max = Val + 10*pi/160;
  };

  AnyDesVar SeatFric = {
    Val = Main.SupportSettings.StaticFrictionSeat;
    Min = 0.0;
    Max = 1.0;
  };

  AnyDesMeasure MaxAct = {
    Val = max(..Study.MaxAct());
  };
};
```

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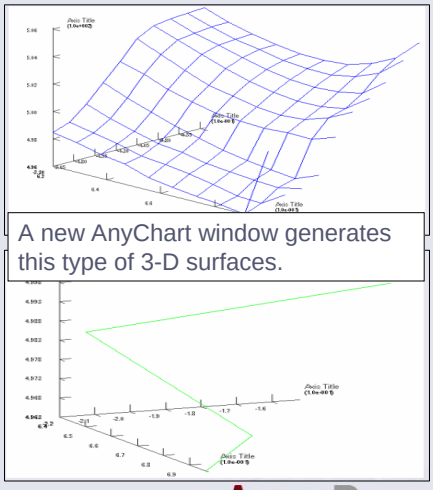
Results

- Parameter studies
  - A set of parameters are automatically varied in a grid structure.
  - Gives you a complete overview of the design space.
  - May require prohibitively many computations for more than a few variables.
- Optimization
  - Definition almost identical to a parameter study.
  - Uses a feasible directions algorithm to search for the optimum.
  - Time grows modestly with the number of parameters.
  - May stop at a local optimum.



A new AnyChart window generates this type of 3-D surfaces.

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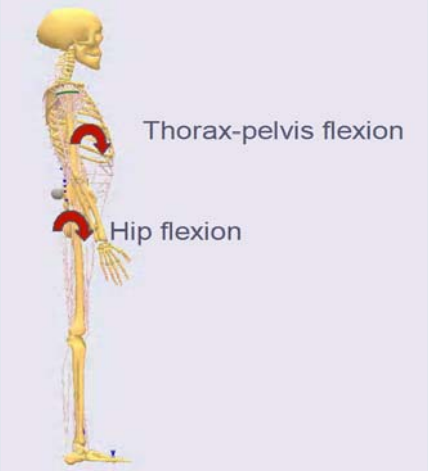
Posture prediction example: Symmetric standing posture

- A static model.
- Assumption: We choose posture to minimize fatigue.
- Formulation: Minimize maximum muscle activity.
- Takes some time to run.



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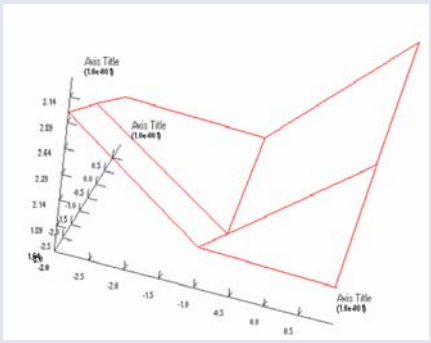
Parameter study and optimization



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Conditional contact

- Muscle strength can now be a function of kinematics.
- Muscles can be used to create unilateral contact.
- This makes conditional contact possible.

Demo!

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User interface improvements

- Model browsing
  - Dump locations
  - Insert object name
  - Include file tree
  - Model browser window
- Object inserter

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There are many other software improvements

Release notes:

http://www.anybodytech.com/466.0.html

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Repository model improvements

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Load-time positions from the mannequin file

Full-body models:

- StandingModel
- FreePosture
- FreePostureMove

New models facilitated!

Demo!

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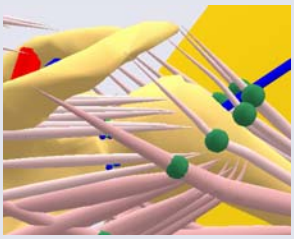
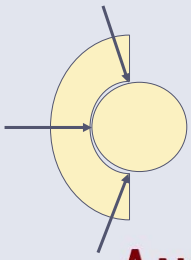
Shoulder joint stability criterion

- The shoulder joint is inherently unstable due to the shallowness of the glenoid.
- Constrain joint reactions to point into the glenoid convexity.





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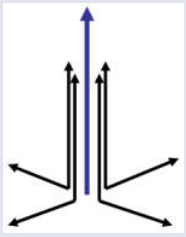
True friction

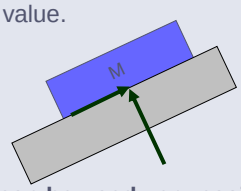
Friction is very important to obtain the correct boundary conditions between human models and environment elements such as seats, floors and handles.

A true Coulomb friction element has been added to the repository models. It is a combination of general muscles and linear combination measures.

The arrangement exploits the muscle recruitment to link normal forces and friction forces in such a way that friction is limited by the normal force but friction can be smaller than the maximally available value.



Schematic friction modeled by artificial muscles. Blue signifies the normal force; black the combined normal and friction forces.



The friction element can be used very easily through an include file included in the Repository.

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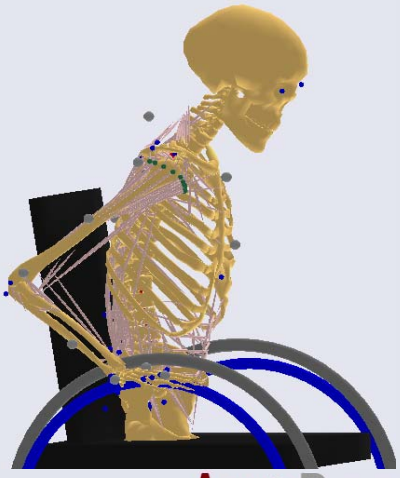
Several new models…

For instance

- WheelChairRancho
- Marker-driven wheelchair model
- Data courtesy of Phil Requejo at Rancho Los Amigos National Rehabilitation Center



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Online resources

- AnyBody Technology
  www.anybodytech.com
  - Free demo licenses
  - Tutorials
  - Further info: Email: anybody@anybodytech.com
  - Release notes: http://www.anybodytech.com/466.0.html
- The AnyBody Research Project
  www.anybody.aau.dk
  - Public domain library of body models and applications
  - Publications, for instance about scaling.

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Thank you!
Q & A

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