

Welcome!

Find your group:

- Modeling Assistive Devices:
 - Rogers Team, Sawicki Team, Silverman Team
- Tuning Simulations to Study Pathology
 - Thompson, Higginson
- Analyzing Simulations with IAA and JR
 - Sasaki Team, Barrett Team, Strube, Lathrop
- Simulations with Custom Components
 - Arnold Team, Miller Team

Agenda

8:30 – 9:00	Welcome and Workshop Goals <i>Scott Delp and Jen Hicks</i>
9:00 – 10:15	Participant Introduction and Goals
10:15 – 10:30	Break
10:30 – 12:00	Generating Forward Simulations with OpenSim <i>Ajay Seth, Sam Hamner, and Tim Dorn</i>
12:00 – 1:00	Lunch
1:00 – 1:45	Components of an OpenSim Model and Model Editing <i>Matt Demers</i>
1:45 – 2:00	Break
2:00 – 2:15	Solidify Project Plans
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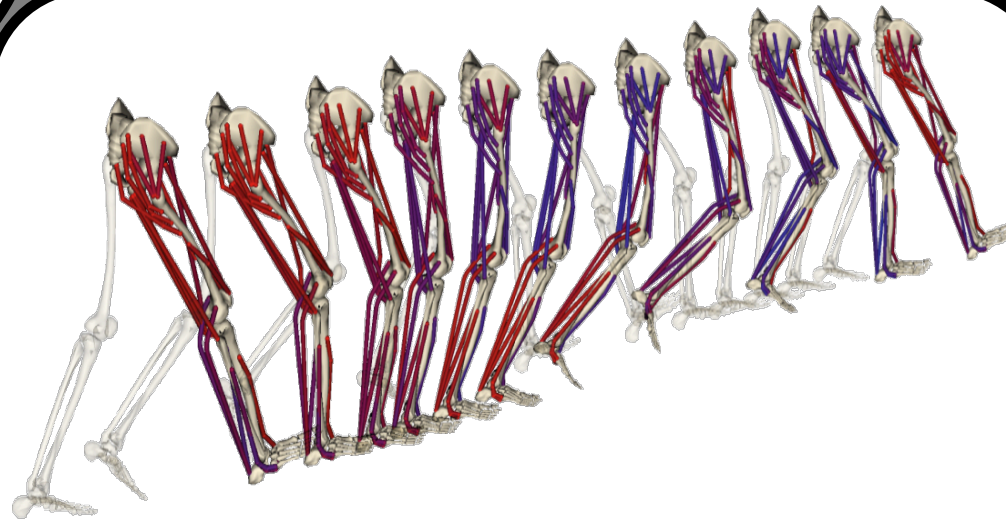


<https://simtk.org/home/opensim>

Purpose of modeling and simulation

Visualize
complex
movement
patterns

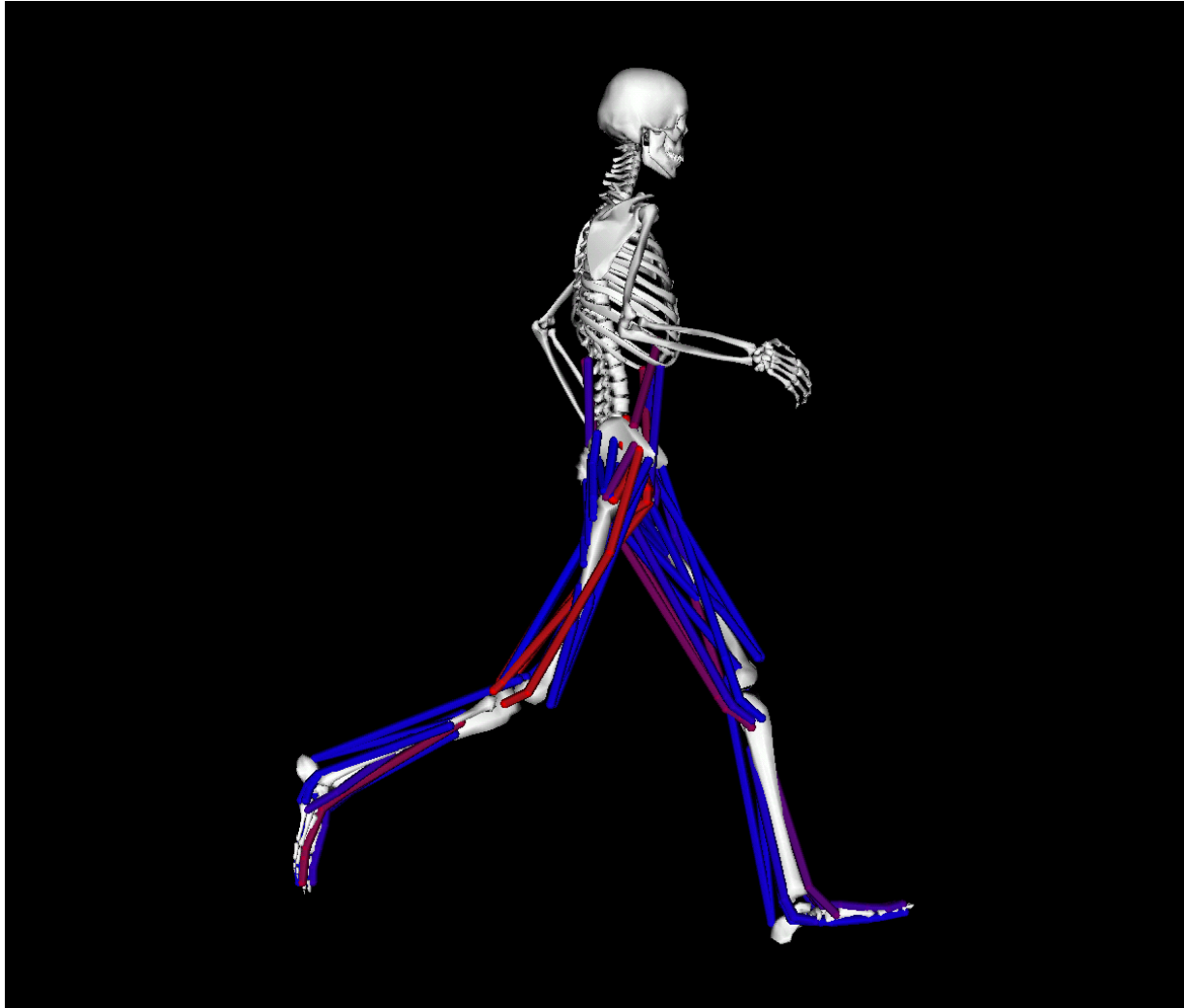
Probe
parameters
that
are difficult
to measure



Perform
“what if”
studies

Identify
cause-effect
relationships

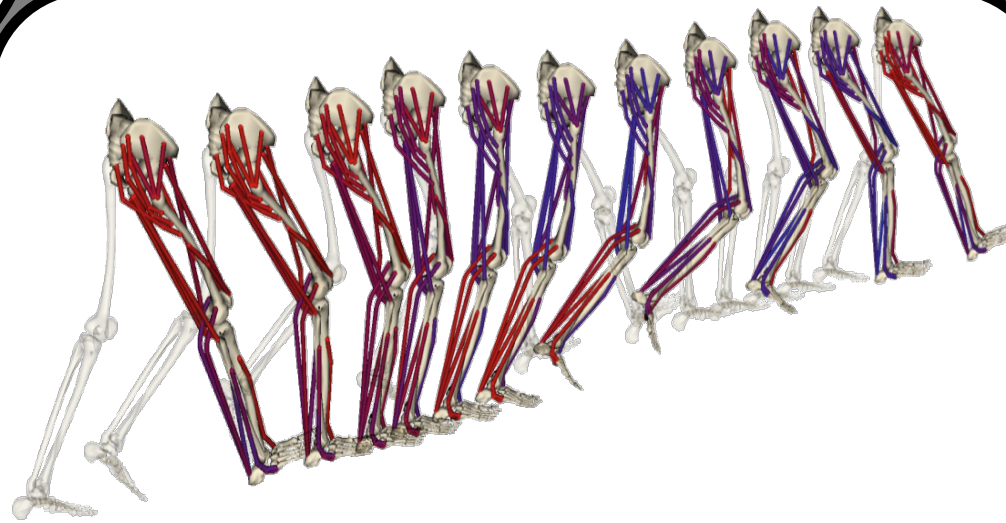
Visualize human running in detail



Purpose of modeling and simulation

Visualize
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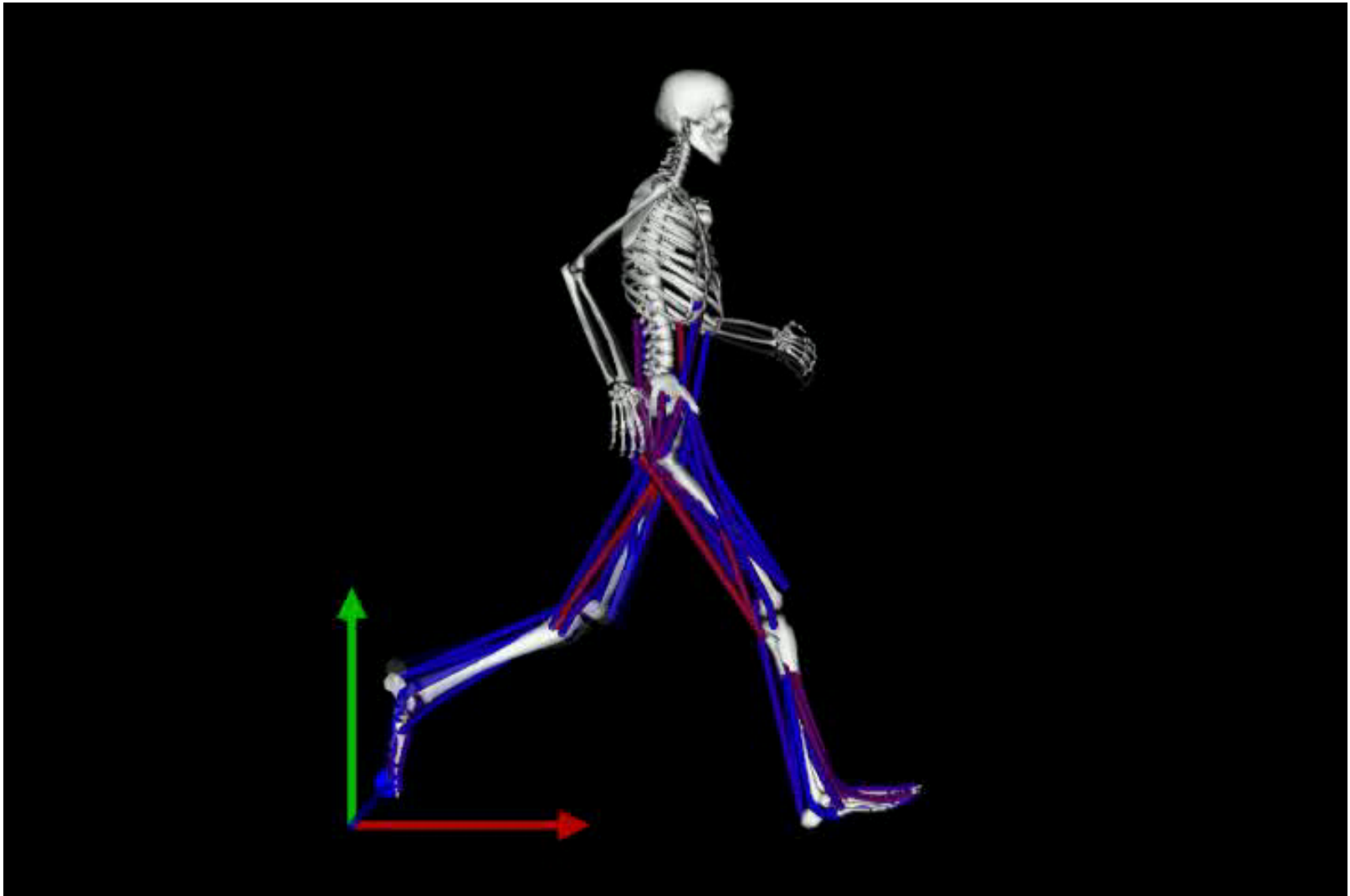
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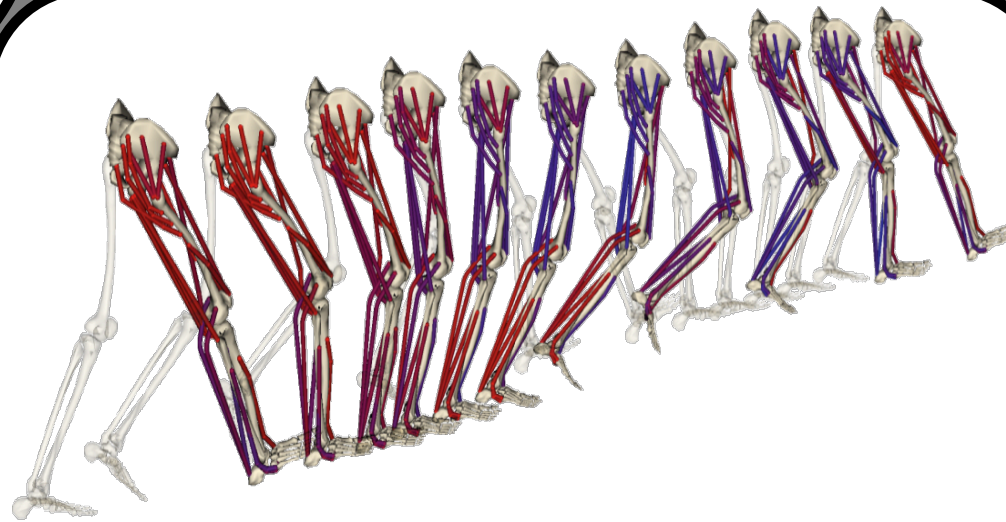
Probe the function of a muscle



Purpose of modeling and simulation

Visualize
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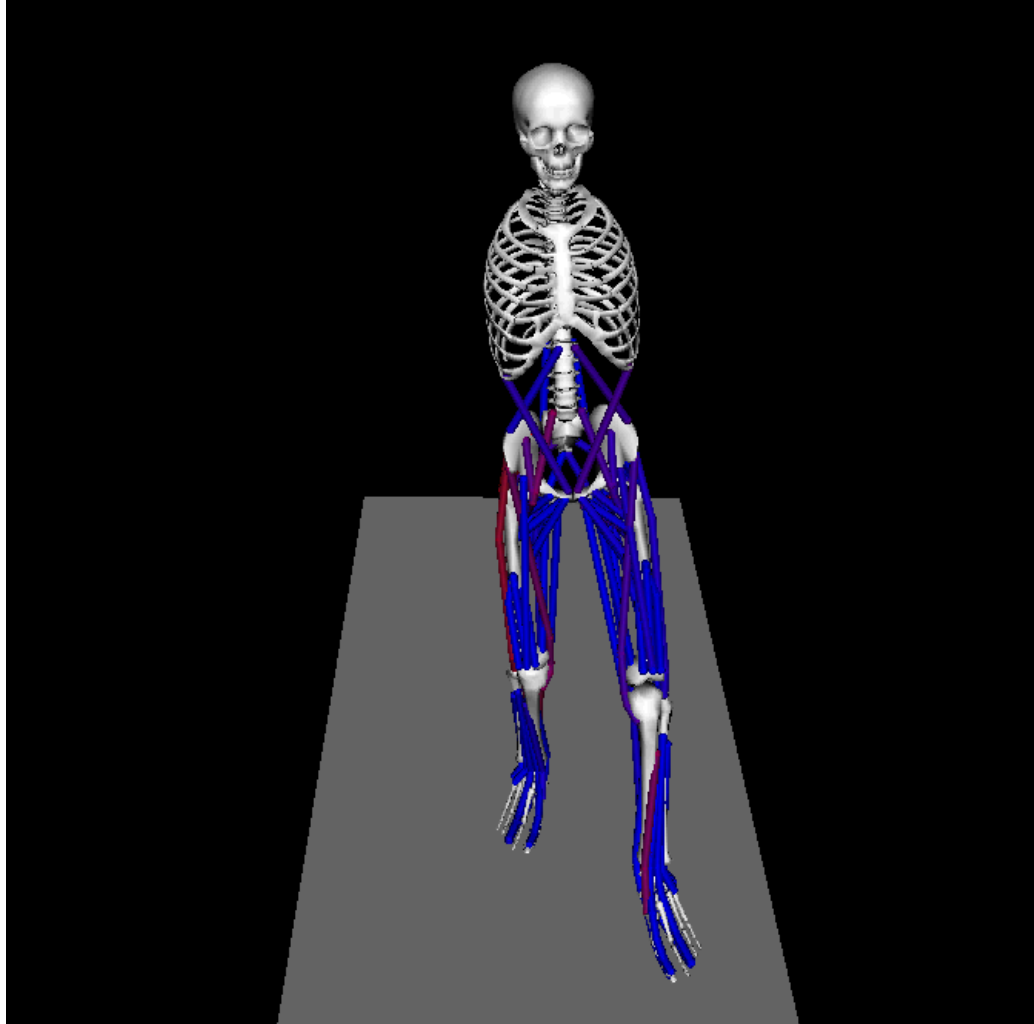
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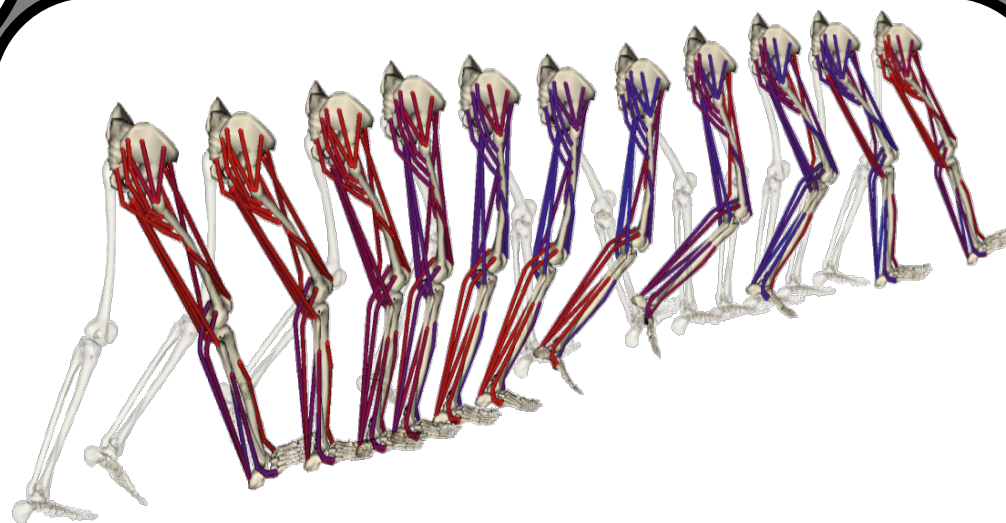
Examine causes of crouch gait



Purpose of modeling and simulation

Visualize
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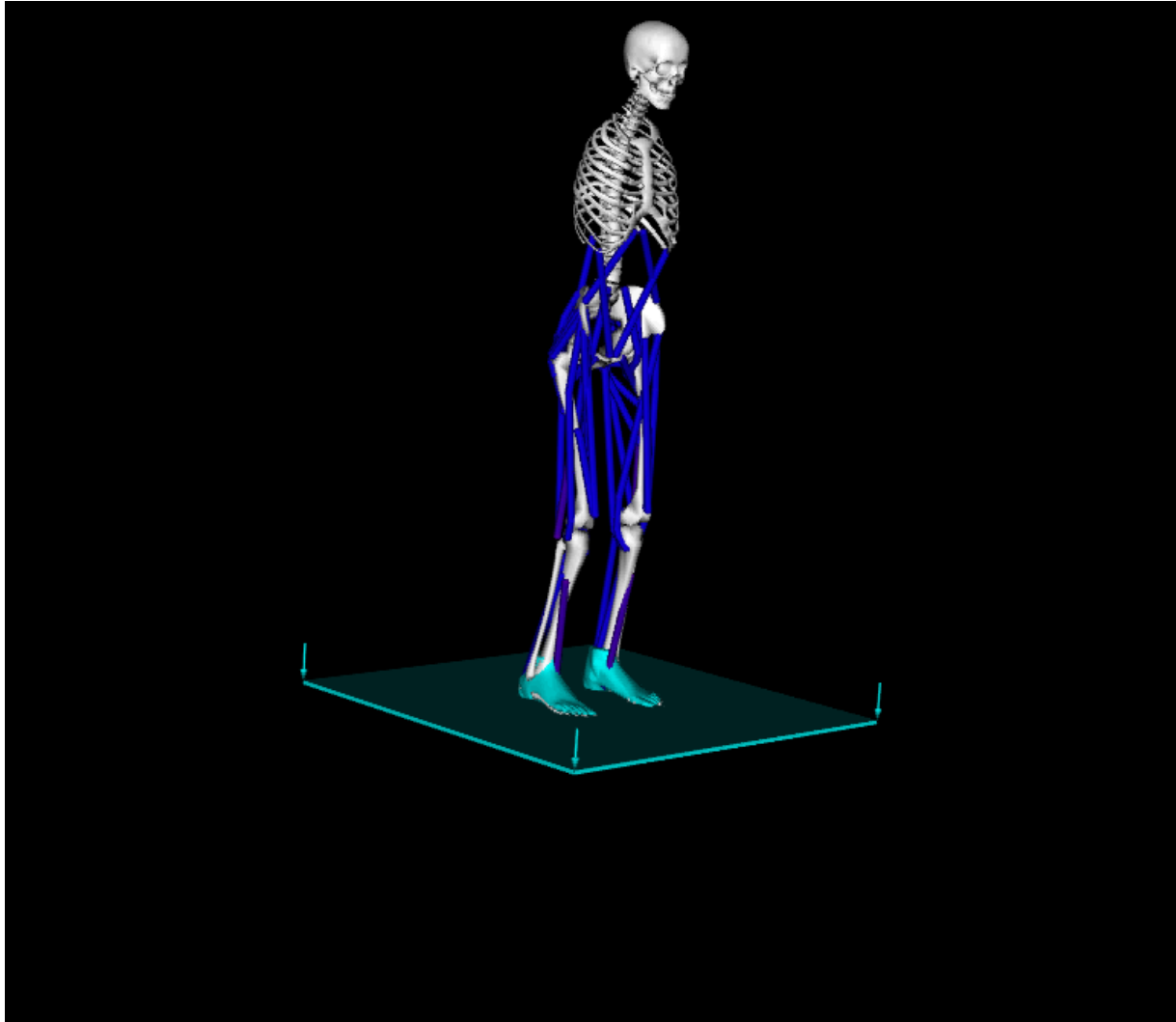
Probe
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What happens if the floor drops?



Problems with current paradigm

- Difficult to reproduce results of published papers
- Limited testing and peer review
- Commercial codes valuable but not extensible
- Cost of commercial code limits use in teaching
- Building your own code is a challenge
- Difficult to bring your innovations to the world
- Continuity is lost when students graduate
- Isolation

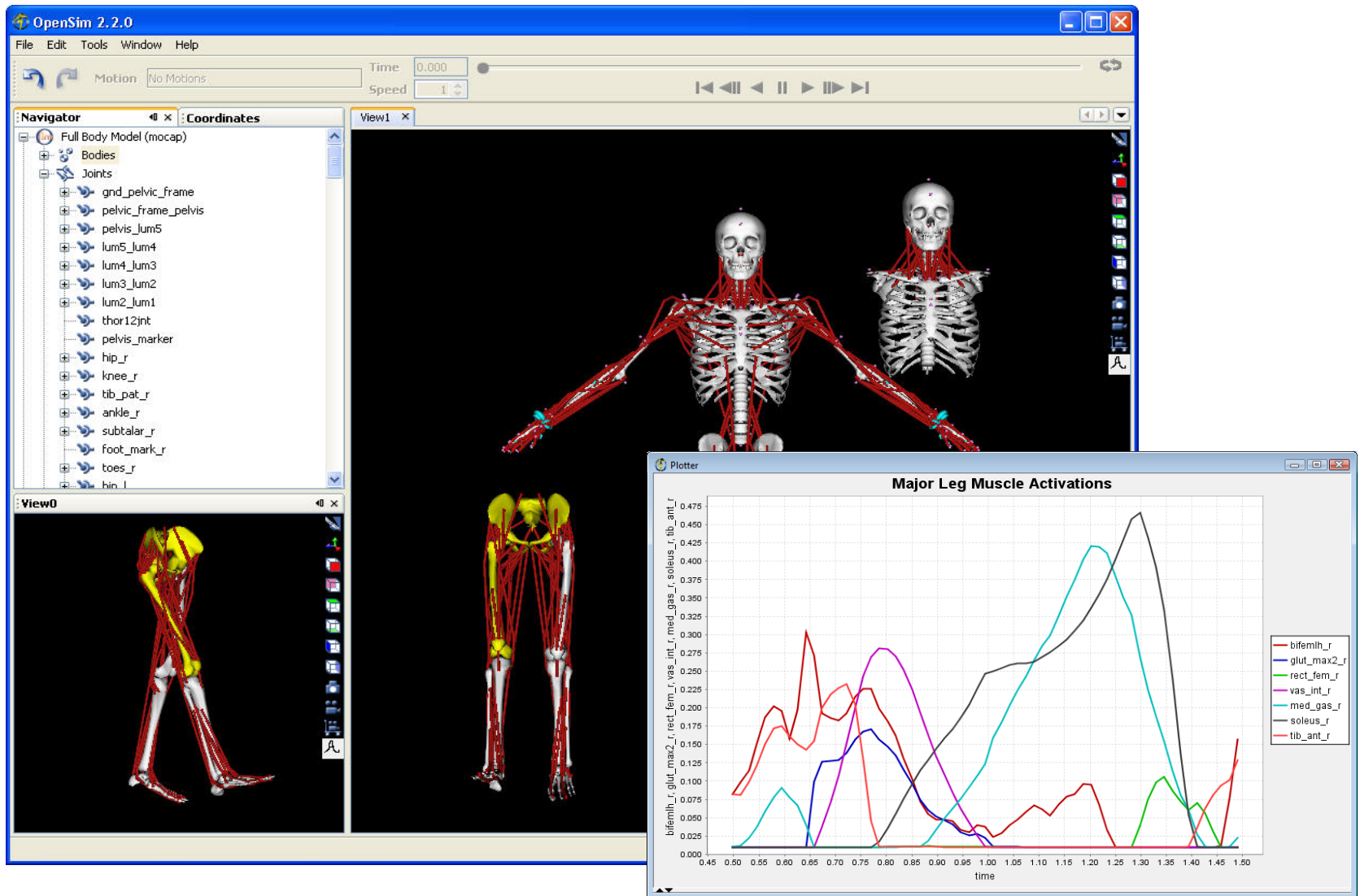
What does OpenSim provide?

- Open access - results can be reproduced and tested
- Extensible - you can add your own features
- Widely available - bring your innovations to the world
- Free - teaching materials
- Access - a community of experts
- Continuity - for your lab

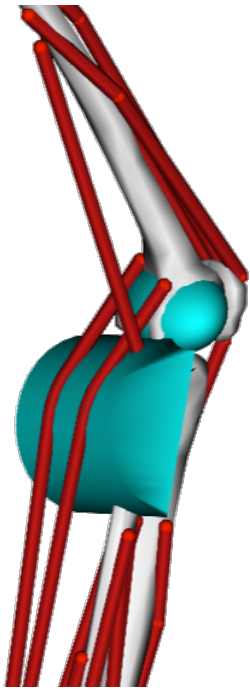
Some OpenSim features

- Standard format for exchanging models
- General purpose inverse dynamics
- Optimization to estimate muscle and joint forces
- Methods to create simulations from motion capture
- Tools to analyze simulations
- A fast and open dynamics engine

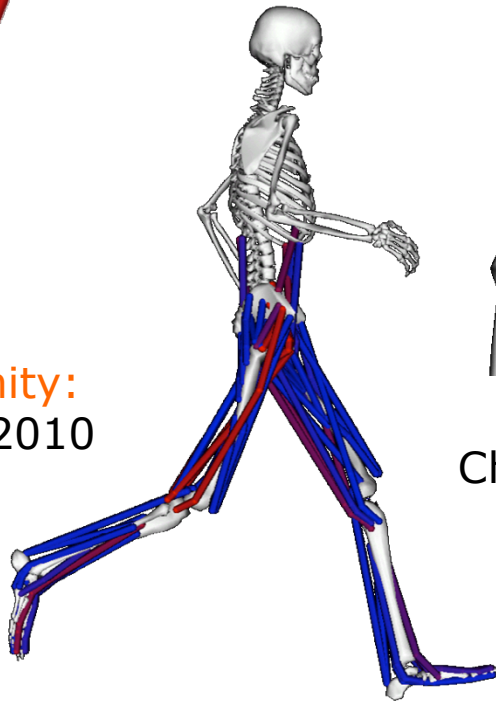
OpenSim is an application



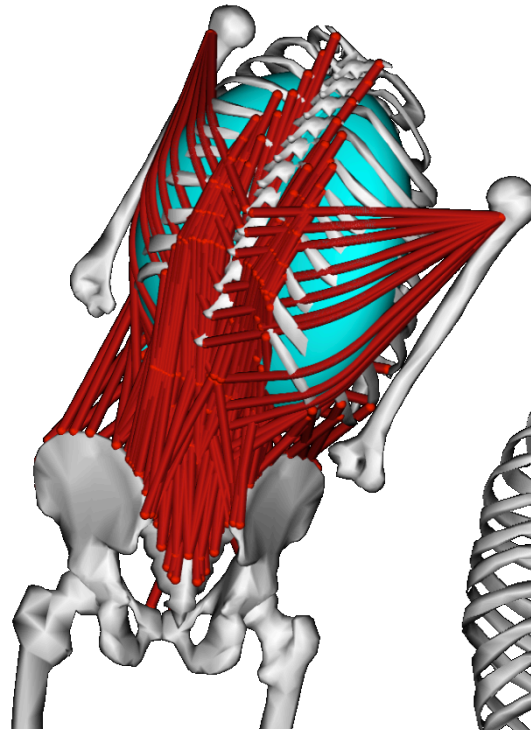
OpenSim is a repository of models



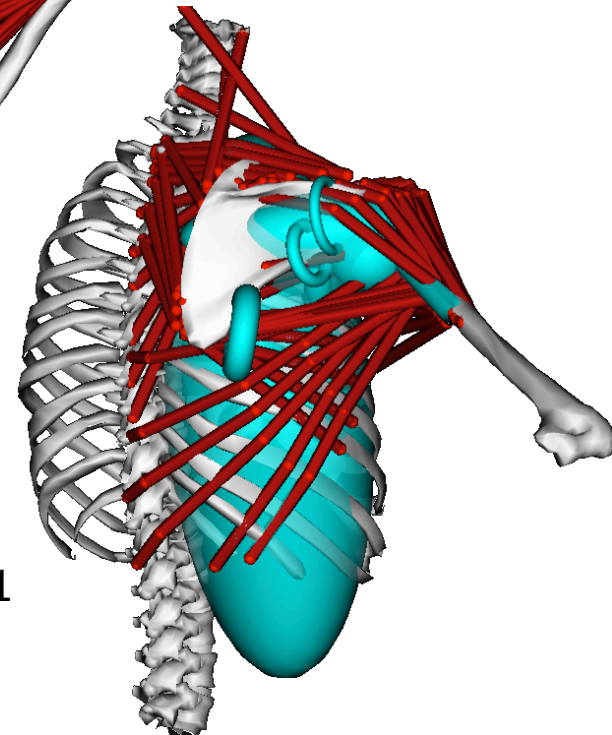
Lower-extremity:
Arnold et al, 2010



Running: Hamner et al, 2010



Lumbar-spine:
Christophy et al, 2011



Shoulder:
Matias et al, in prep.

OpenSim is a resource

<http://opensim.stanford.edu>



OpenSim Community

- SEE THE WORK
- JOIN THE COMMUNITY
- FIND SUPPORT, EVENTS, & RESOURCES



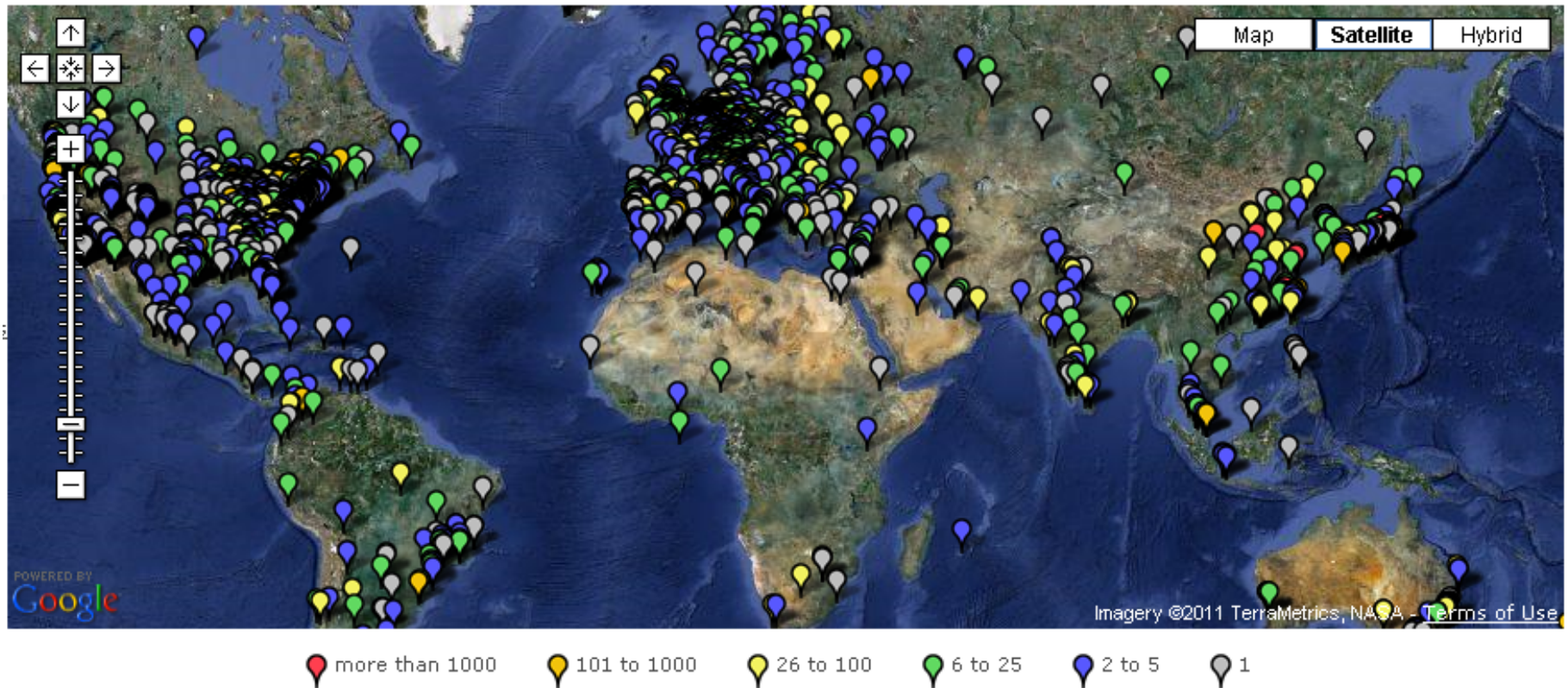
OpenSim

State-of-the-art
simulation software
advancing research
in rehabilitation science

**SEE THE GREAT WORK,
JOIN THE OPENSIM COMMUNITY
TO GET STARTED, AND
FIND THE SUPPORT, EVENTS,
& RESOURCES YOU NEED
TO SUCCEED.**

OpenSim is a worldwide community

86702 Page Hits in the past 180 Days (9742 Unique Visitors)
2345 Stanford Page Hits (81 Unique Visitors)



OpenSim is a team of contributors:



Scott Delp



Ayman Habib



Jennifer Hicks



Jeff Reinbolt



Ajay Seth



Michael Sherman



Edith Arnold



Matt DeMers



Sam Hamner



Chand John



Kat Steele



Tim Dorn



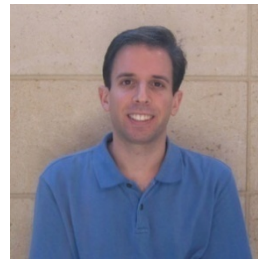
Matt Millard



Clay Anderson



Allison Arnold



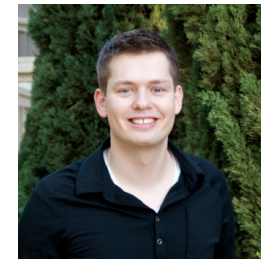
Eran Guendelman



May Liu



Peter Loan



Ian Stavness



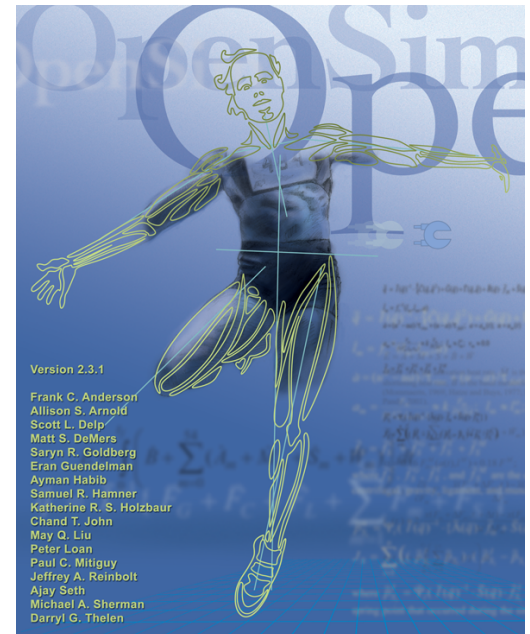
You!

Objectives for the Workshop

- Learn the underlying theory, best practices, and troubleshooting tips for generating simulations in OpenSim
- Learn how to create and edit models in OpenSim
- Breakout Session: Find out how you can extend OpenSim with the API
- Achieve your project goals and share your results
- Advance your research!

The Workshop Software

- OpenSim 2.4 Features:
 - Inverse Kinematics and Dynamics use SimTK solver—faster and more robust
 - Flexible external loads
 - New visualization features
 - Tool in the GUI to convert old setup files
- Preview of OpenSim 3.0!
- Help us improve the software:
 - Help->Bug Report
 - Help->Feature Request



Workshop Resources

- Lectures and Examples
- Handout
- OpenSim Staff
- Other Workshop Participants

- Online Resources!
 - http://opensim.stanford.edu/support/support_index_test.html

Final Presentations

- Showcase your results on Wednesday by sharing:
 - Video(s) of your simulations
 - Demo your models or simulations
 - Figures demonstrating cool results
 - Blooper videos
- Awards:
 - Coolest Demo or Video
 - Biggest Research Discovery
 - Best Blooper

Getting the most out of the workshop:

- Set clear and manageable project goals
- Help each other
- Use your resources: lectures, handout, and online materials
- Still need help? Find the right person to ask your questions
- Have fun and take breaks

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