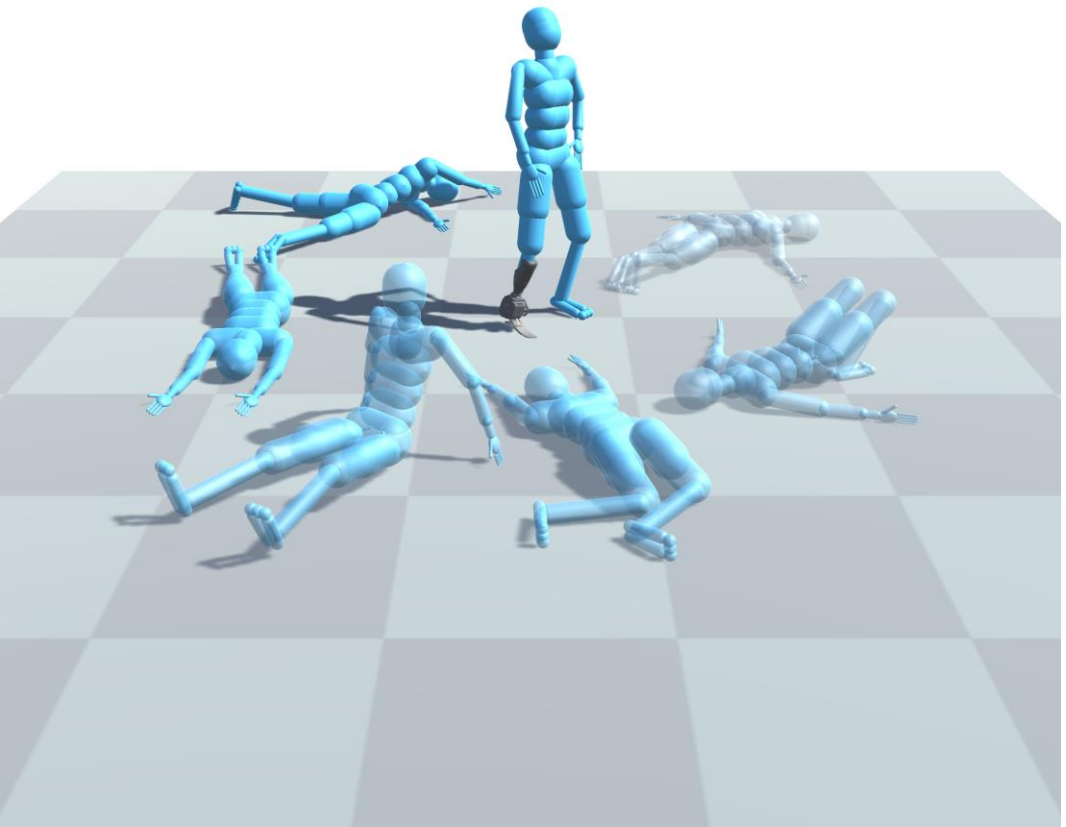
Just keep trying…



Please get the updated code:

https://github.com/Balint-H/ssnr_sim

Organizers: Arnault Caillet, Balint Hodossy

WS5 Dynamic Simulation of Assistive Robotics and Human Motion

Day 1: Inverse Modelling

- Intro to simulation, engines and approaches (forward/inverse). (15 m)
- Neuromechanics basics. (15 m)
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What kind of models?

This workshop won't cover small-scale fluid or finite-element simulations.

The focus is on articulated rigid bodies, like robots, or you!

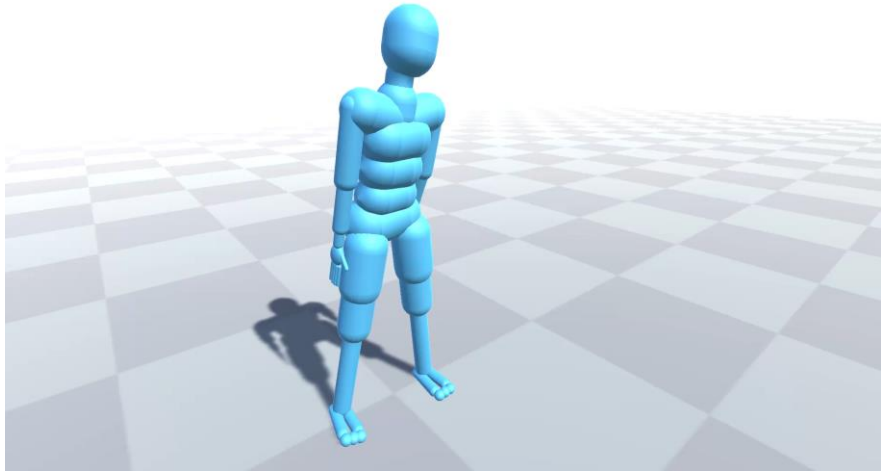
Why make models?

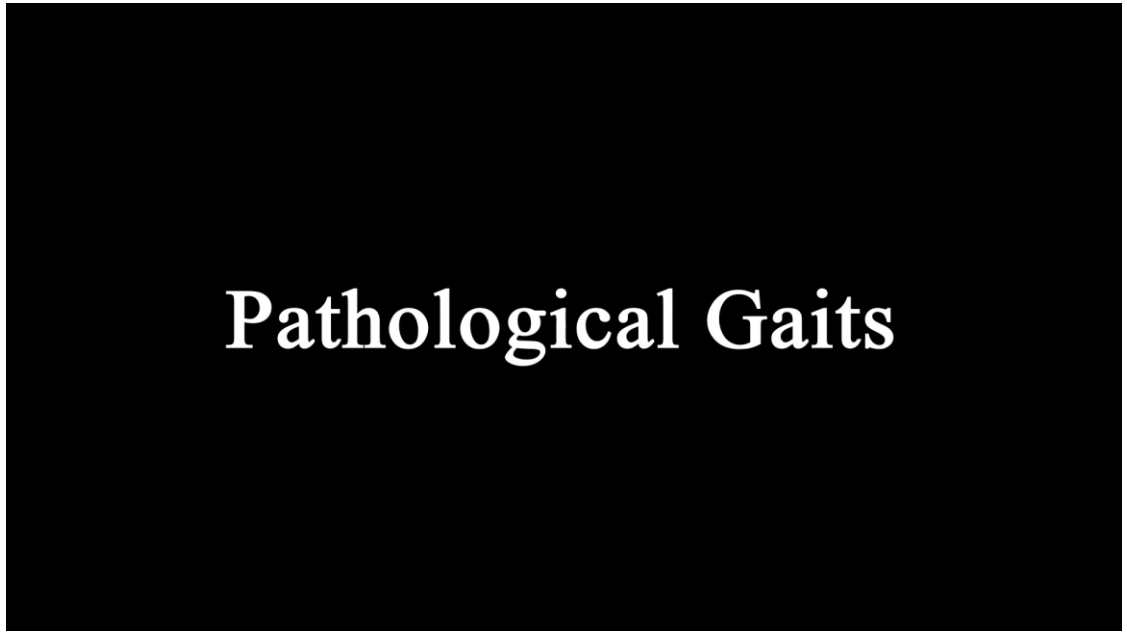
You want to understand a problem.
“I know, I’ll simulate it.”
Now you have two problems.

Why make models?

- Test understanding
- Design and prototype
- Learn and transfer insights

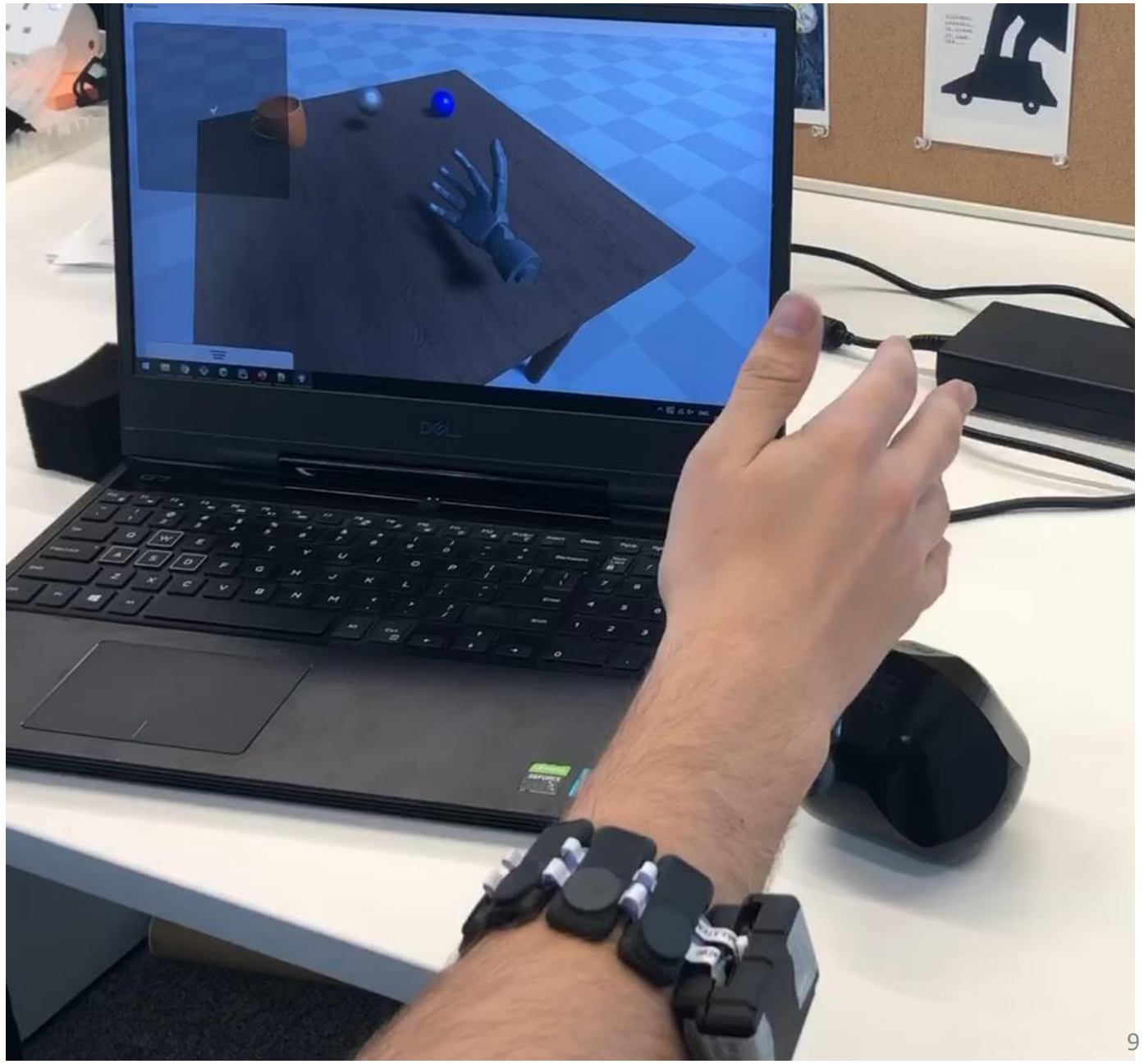
Simulate to test understanding



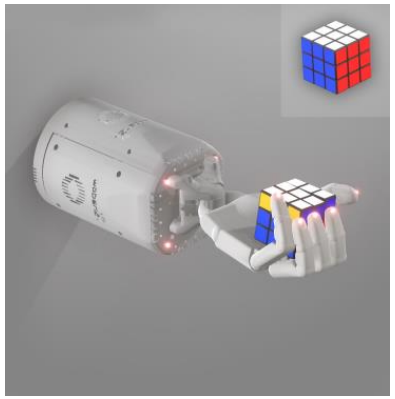


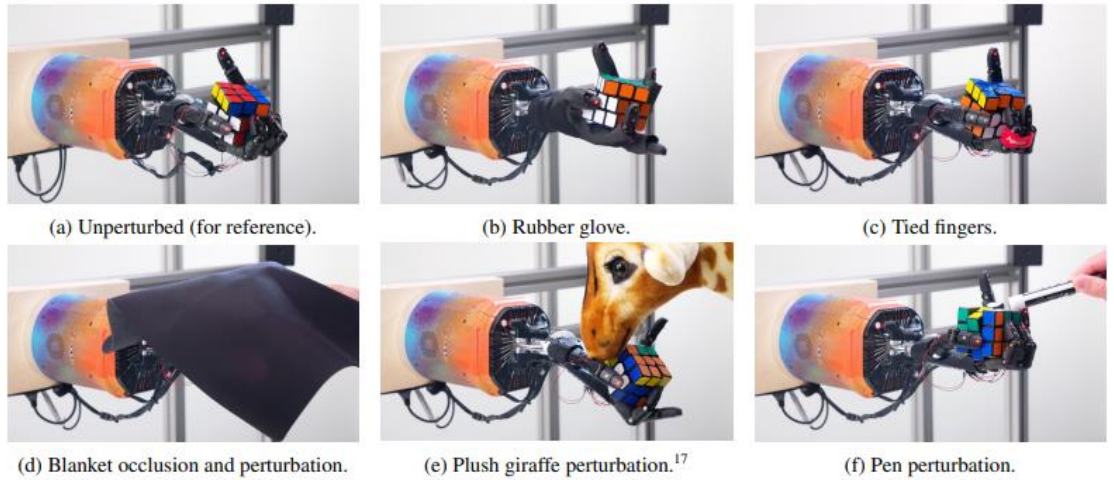
Park, J., Min, S., Chang, P.S., Lee, J., Park, M.S. and Lee, J., 2022, July. Generative gaitnet. In *ACM SIGGRAPH 2022 Conference Proceedings* (pp. 1-9).

Prototype controllers and devices



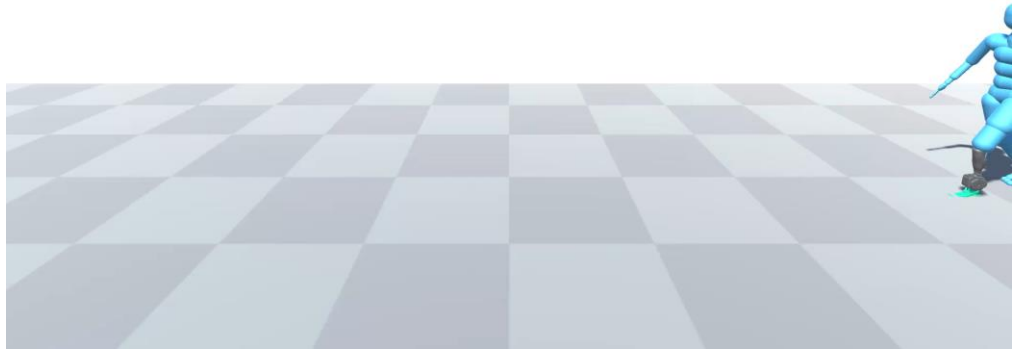
Simulate to learn





Akkaya, I., Andrychowicz, M., Chociej, M., Litwin, M., McGrew, B., Petron, A., Paino, A., Plappert, M., Powell, G., Ribas, R. and Schneider, J., 2019. Solving rubik's cube with a robot hand.

Hodossy, B. and Farina, D., 2022. Shared Autonomy Locomotion Synthesis with a Virtual Powered Prosthetic Ankle.



What articulated body simulators are not great at…

- Tissue dynamics, deformability.
- EMG/biosignal generation.
- 1:1 digital twins from patients.

What articulated body simulators are not great at…

…yet, but new progress is being made in these topics

- Tissue dynamics, deformability.
- EMG/biosignal generation.
- 1:1 digital twins from patients.

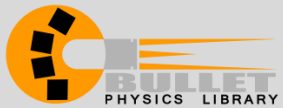
Simulators

Simulation / Development environments

Physics Engines

Simbody

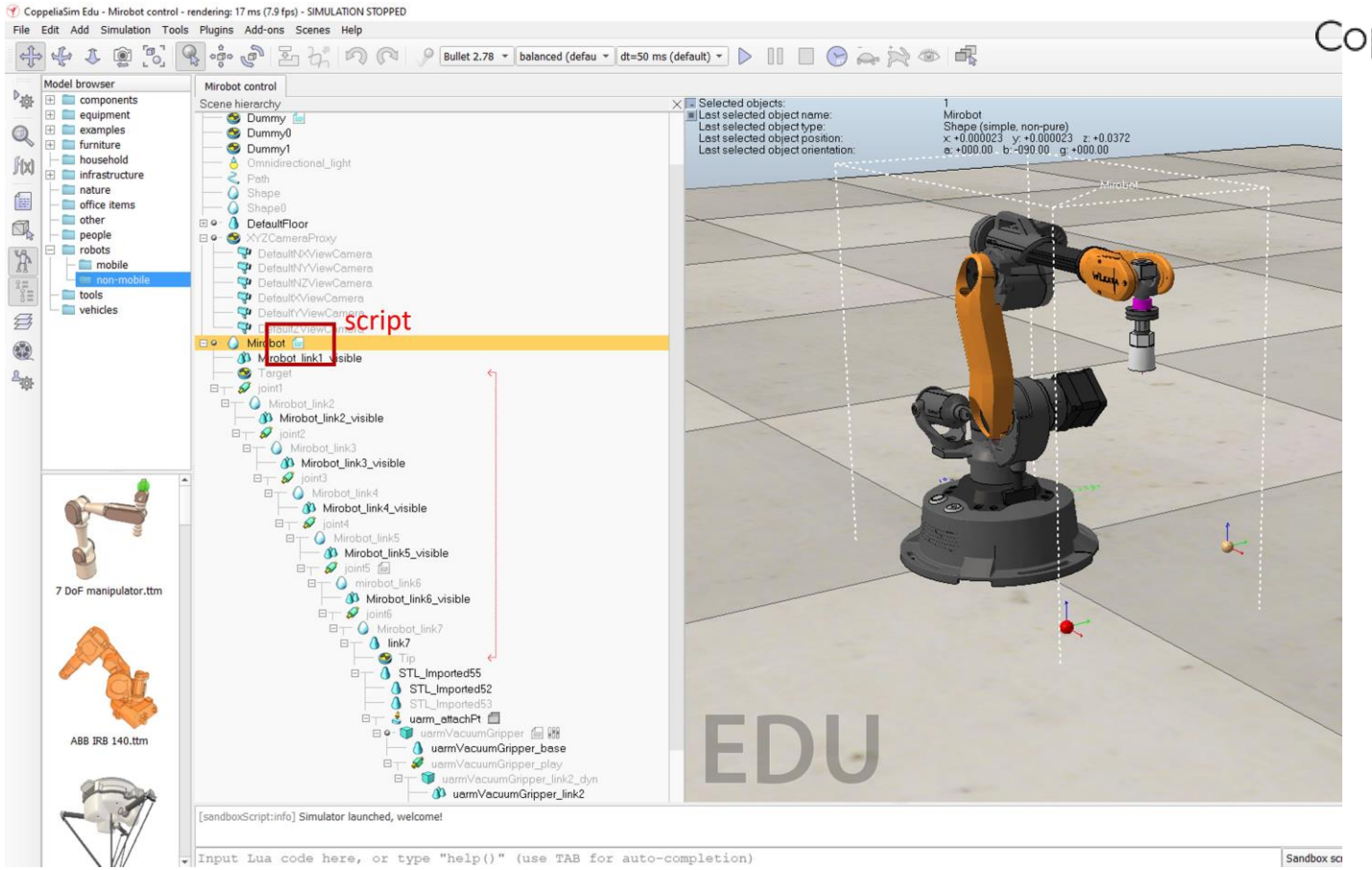
HYFYDY



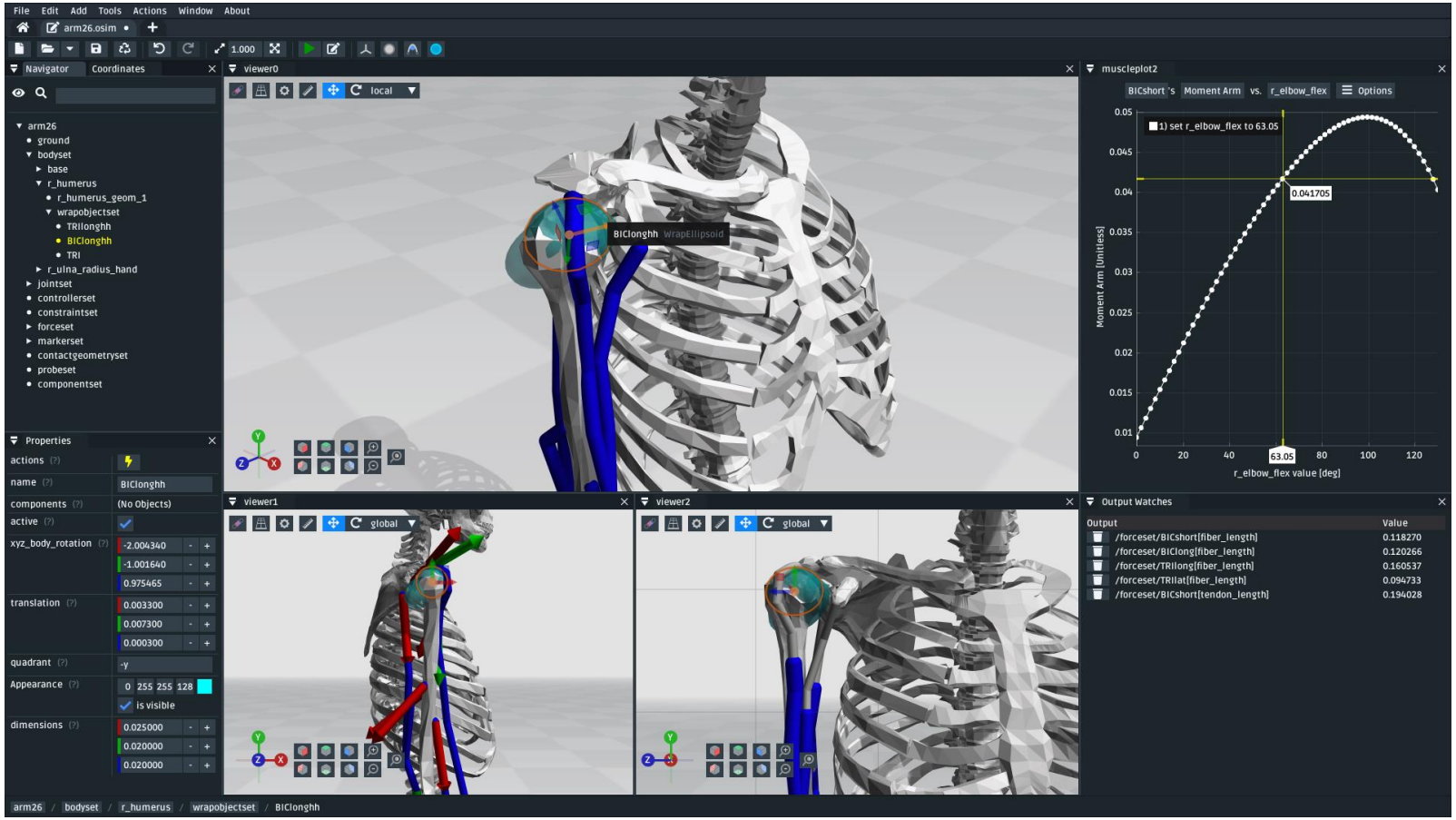
Renderers

I/O

Simulators - UI

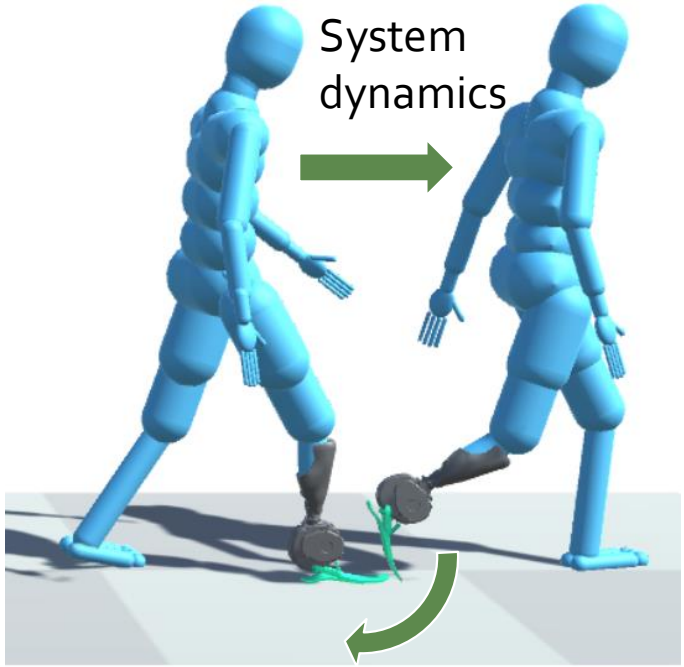


Simulators - UI



Forward vs. Inverse modelling

Forward



Applied forces and torques →
Observe resulting movement

Inverse

Observe movement →
Find forces/torques that explain it

Files for the workshop

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