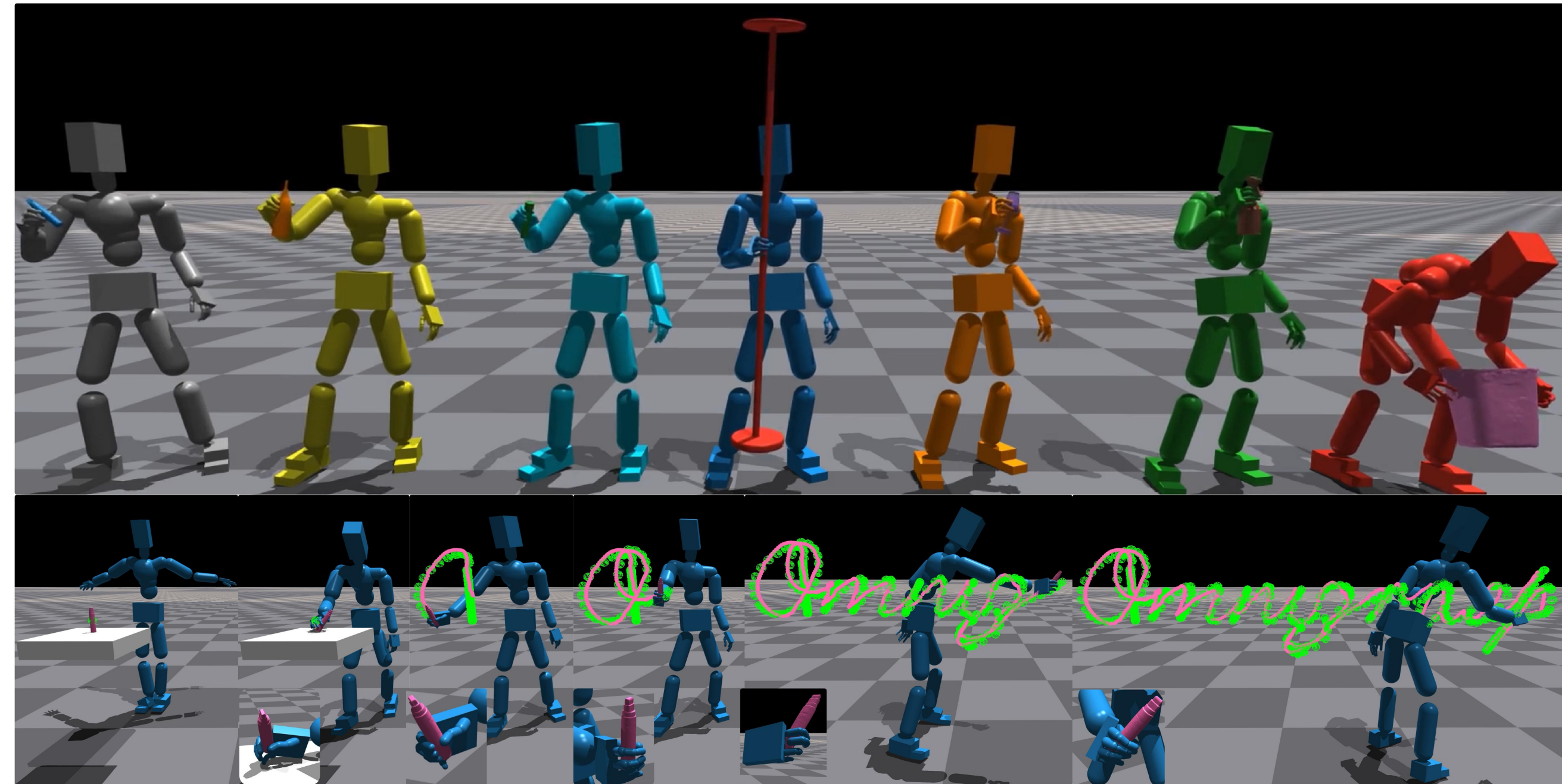




# Omnigrasp: Grasping Diverse Objects with Simulated Humanoids

*Grasping Diverse Object to Follow Diverse Trajectories Using Simulated Humanoids*

<https://zhengyiluo.github.io/Omnigrasp>



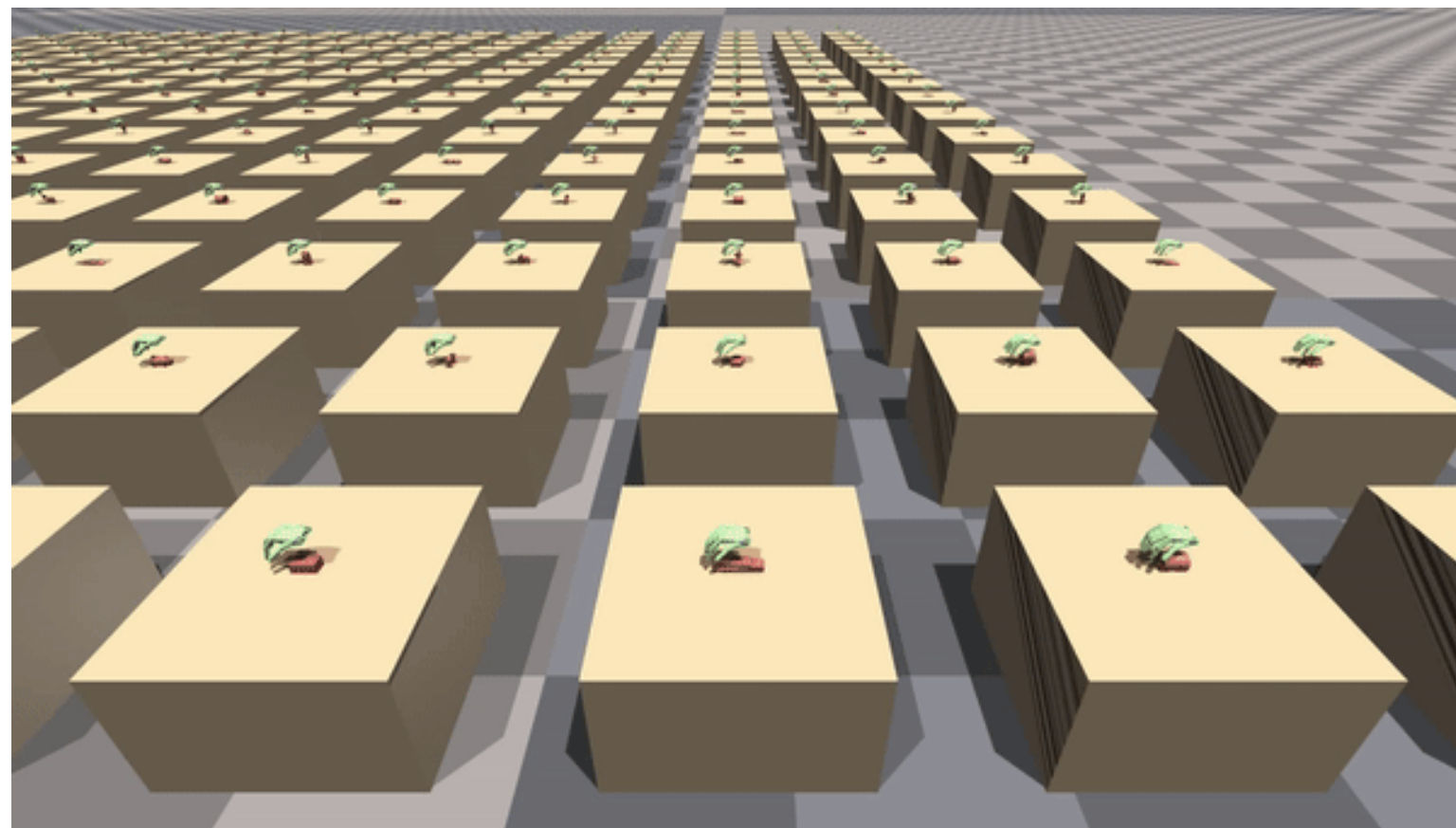
<sup>1</sup>Carnegie Mellon University, <sup>2</sup>Meta Reality Labs

Zhengyi Luo<sup>1,2</sup>, Jinkun Cao<sup>1</sup>, Sammy Christen<sup>2</sup>, Alexander Winkler<sup>2</sup>, Kris Kitani<sup>1,2</sup>, Weipeng Xu<sup>2</sup>



## Motivation

Grasping diverse objects to follow diverse trajectories is challenging, leading to prior work using disembodied hands & study simple trajectories.

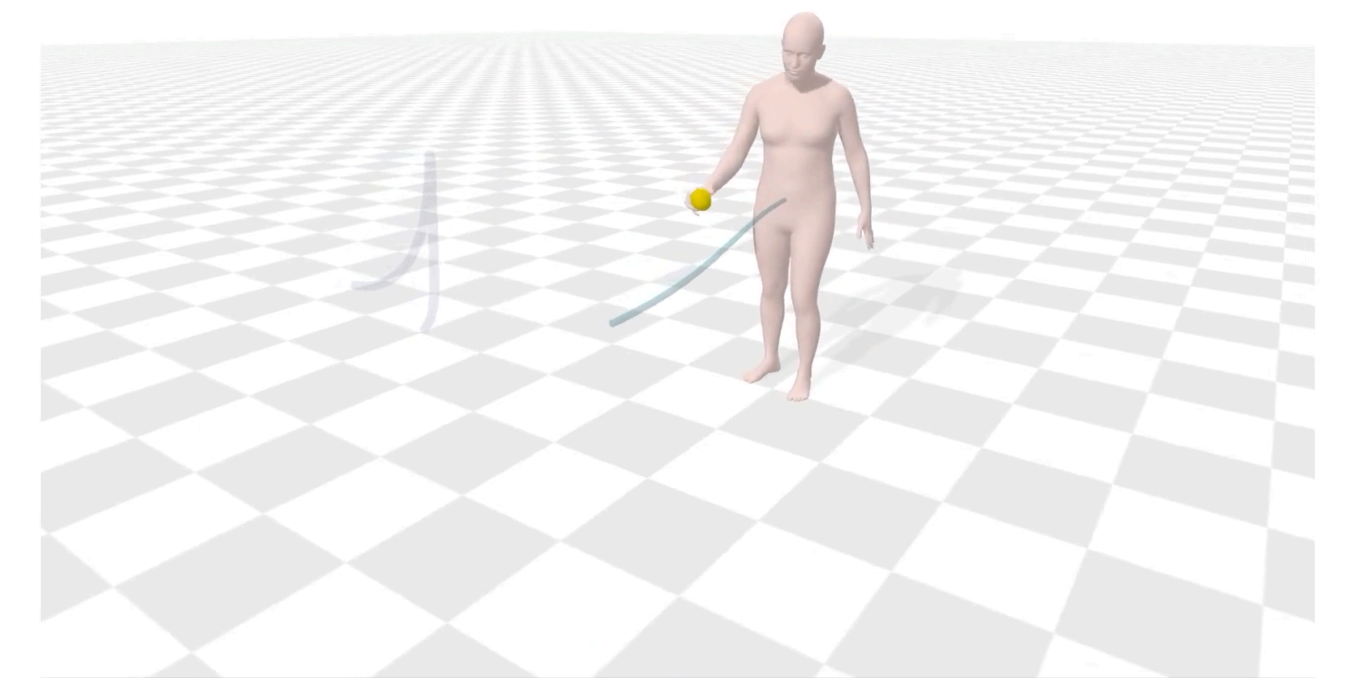


Wan et al, ICCV 2023



Dasari et al, ICRA 2023

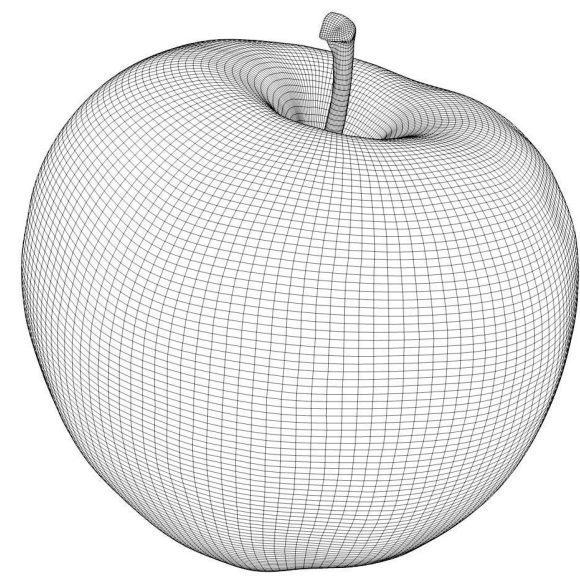
Trajectory Tracking with Our Method



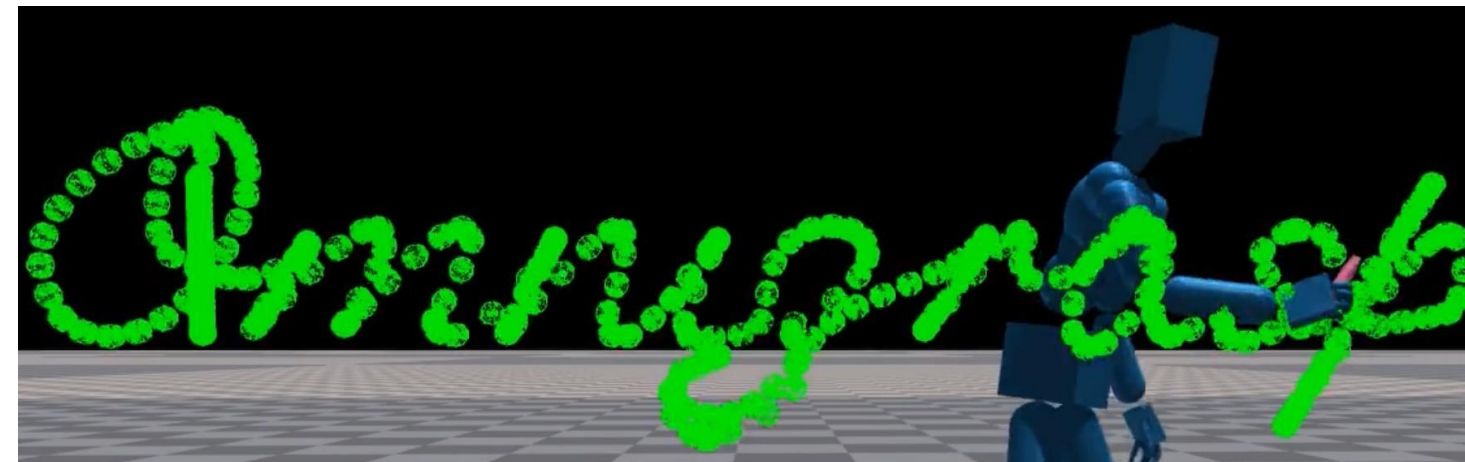
Braun et al, 3DV 2024

# Omnigrasp

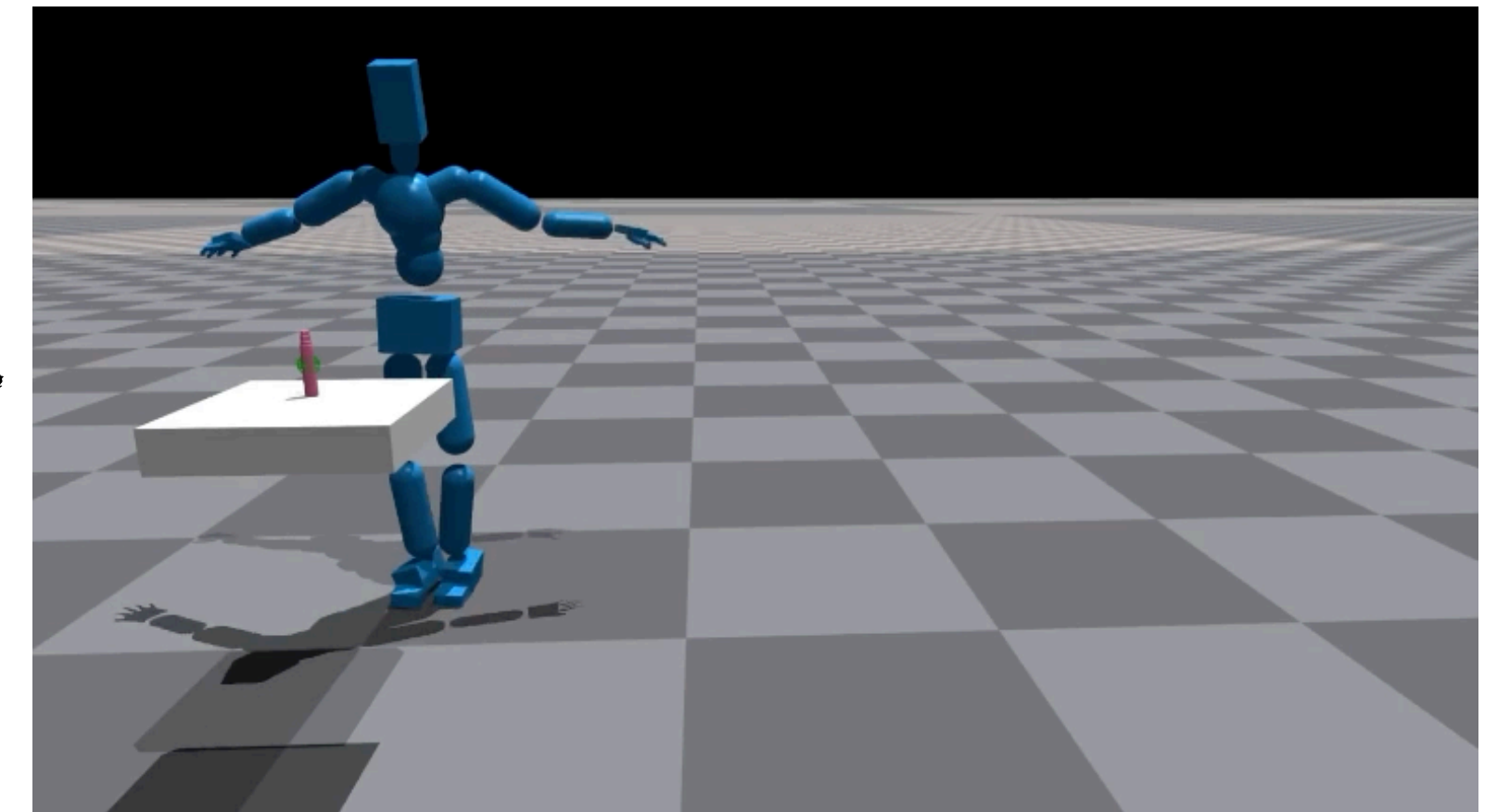
Given an object and a desired object trajectory, we would like to control a simulated humanoid to grasp the object and follow the desired trajectory.



Input: 3D object shape



Input: Desired Trajectory



Grasping + Trajectory Following

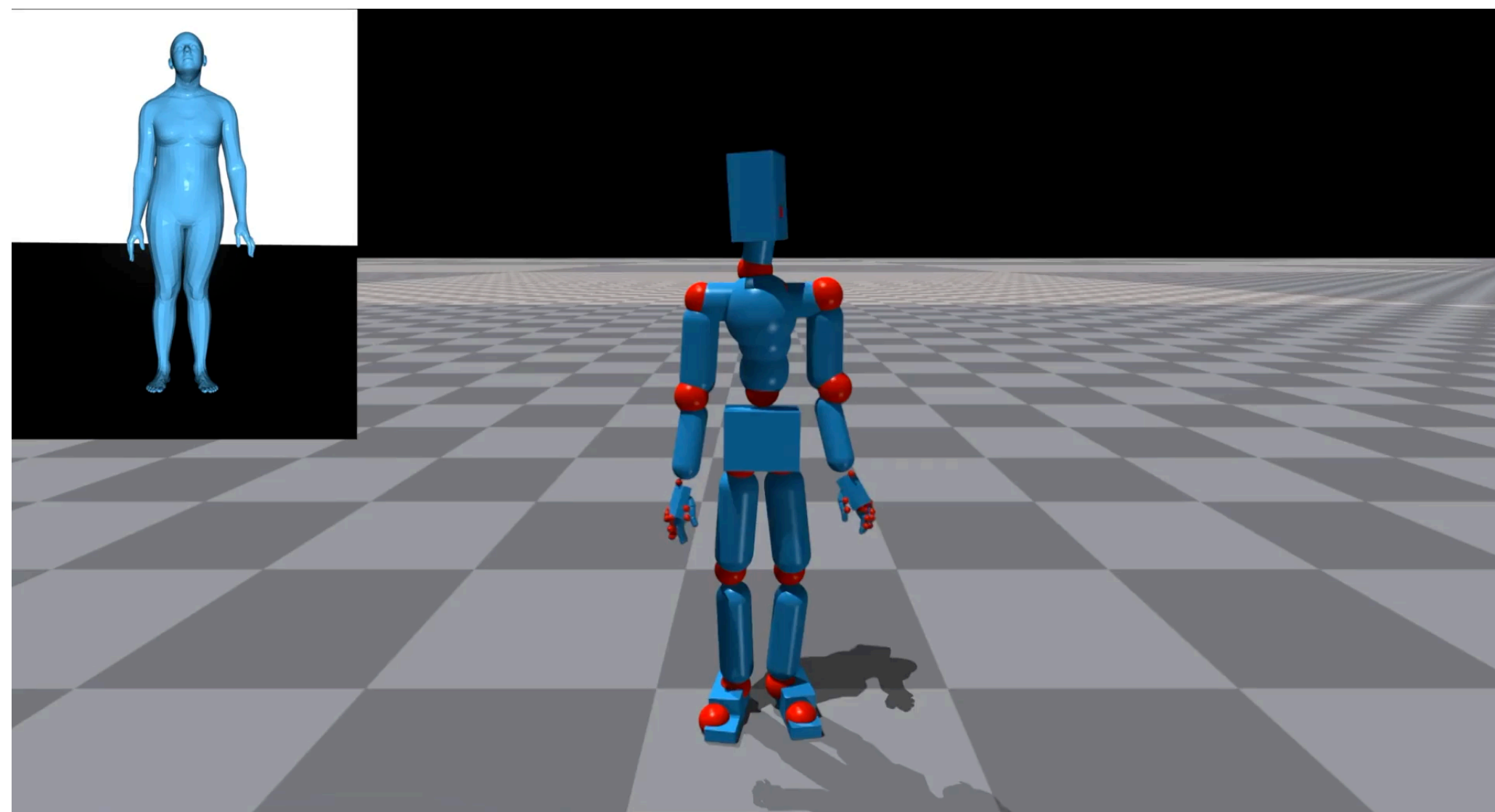
**No ground-truth paired body motion and object trajectories**



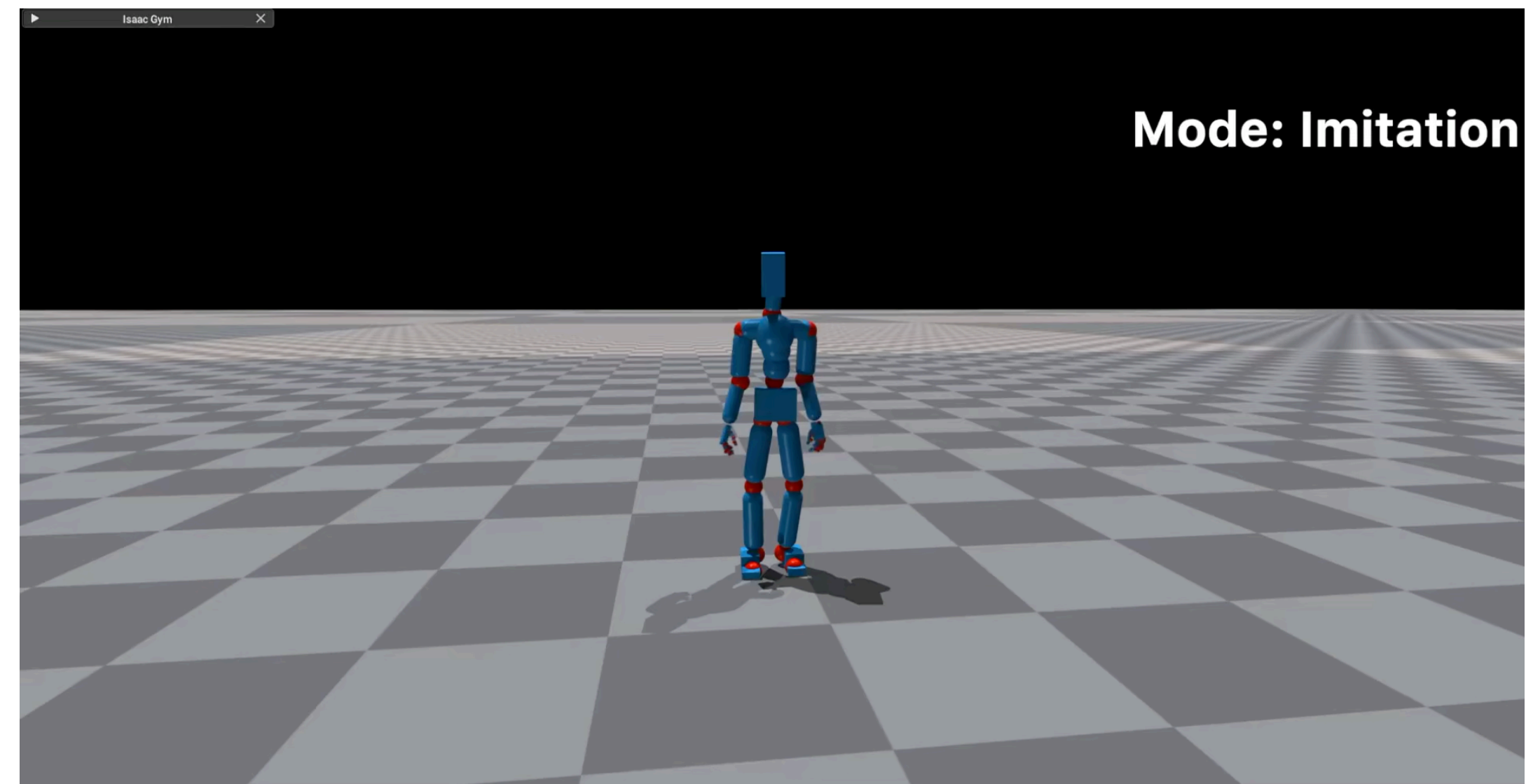
# Acquiring Dexterity via Motion Imitation

We treat each finger joint the same as body joint, and learn a motion imitator (PHC-X). Then, distill it into a motion representation (PULSE-X).

PHC-X



PULSE-X

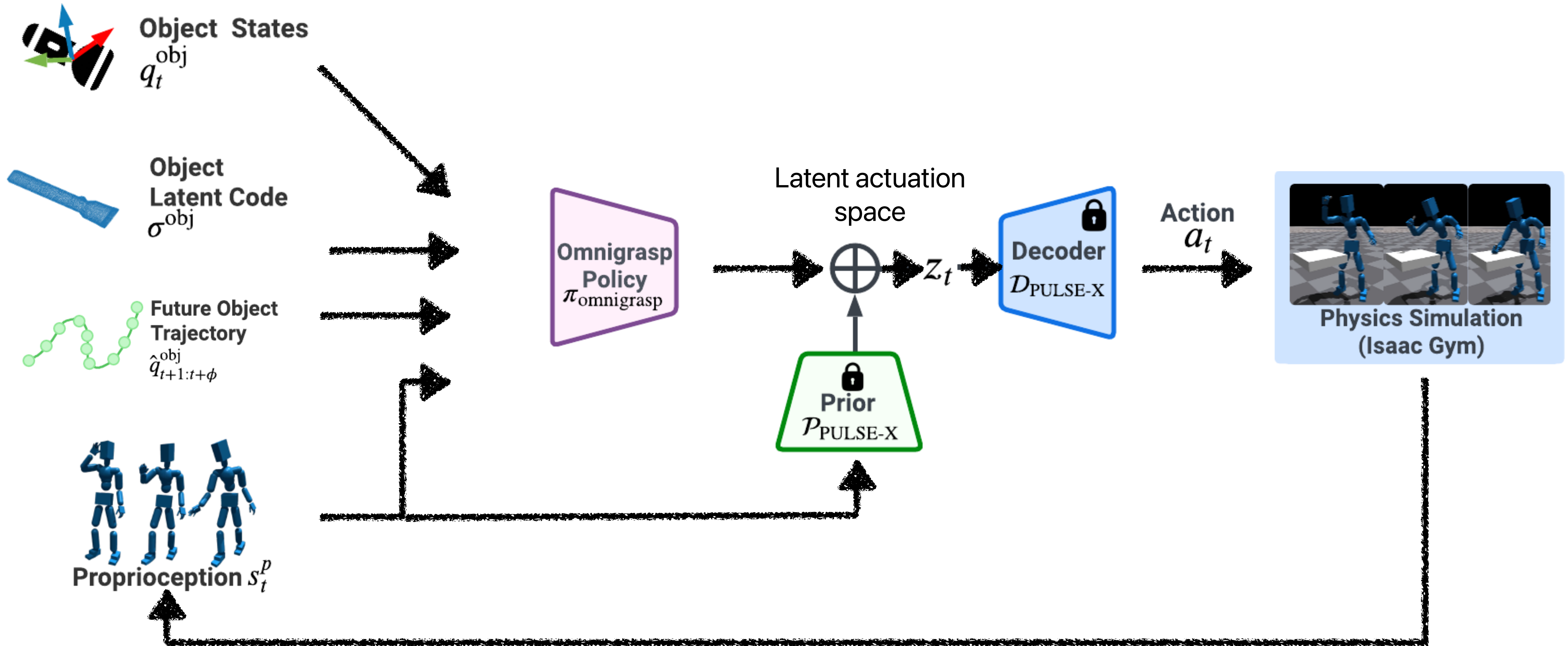


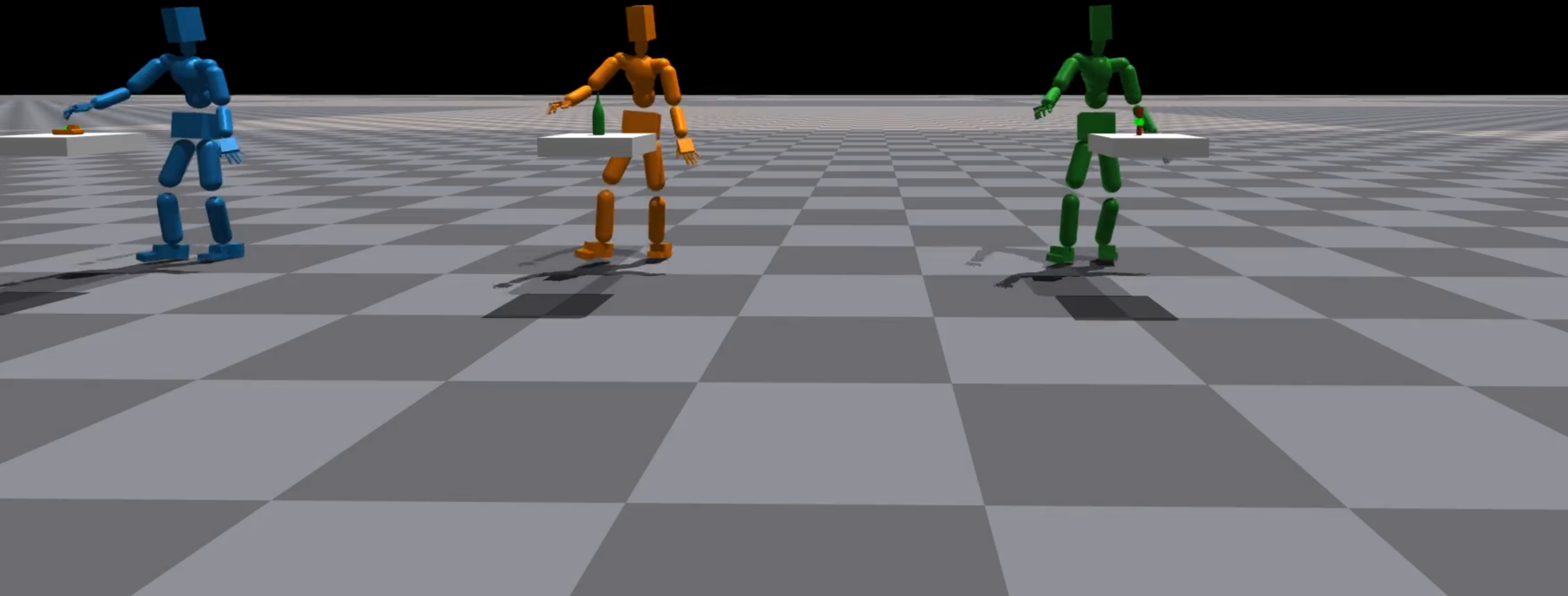
"Perpetual Humanoid Control for Real-time Simulated Avatars" Luo et al. ICCV 2023

"Universal Humanoid Motion Representations for Physics-Based Control" Luo et al. ICLR 2024



# Training Pipeline





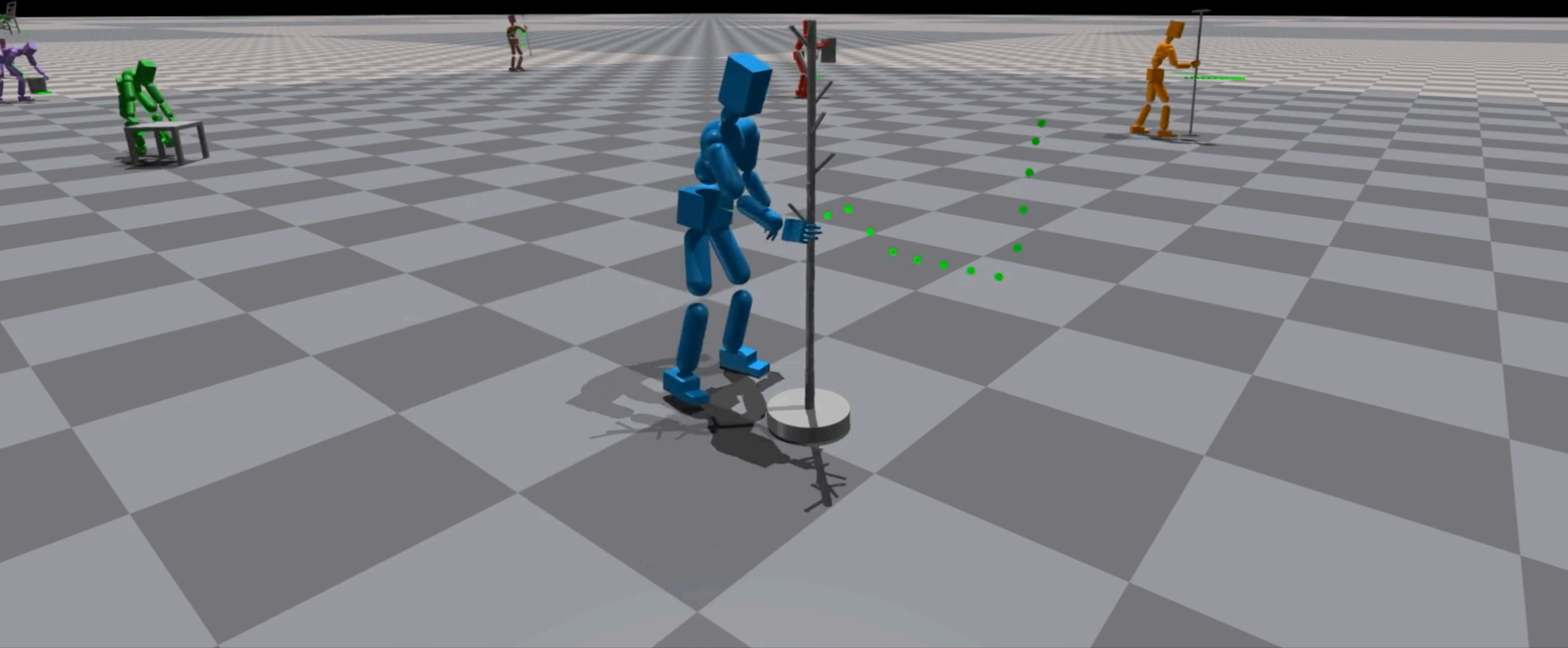




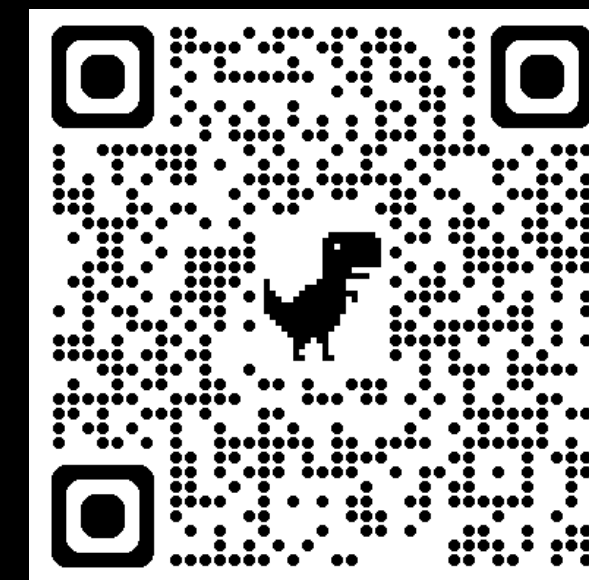




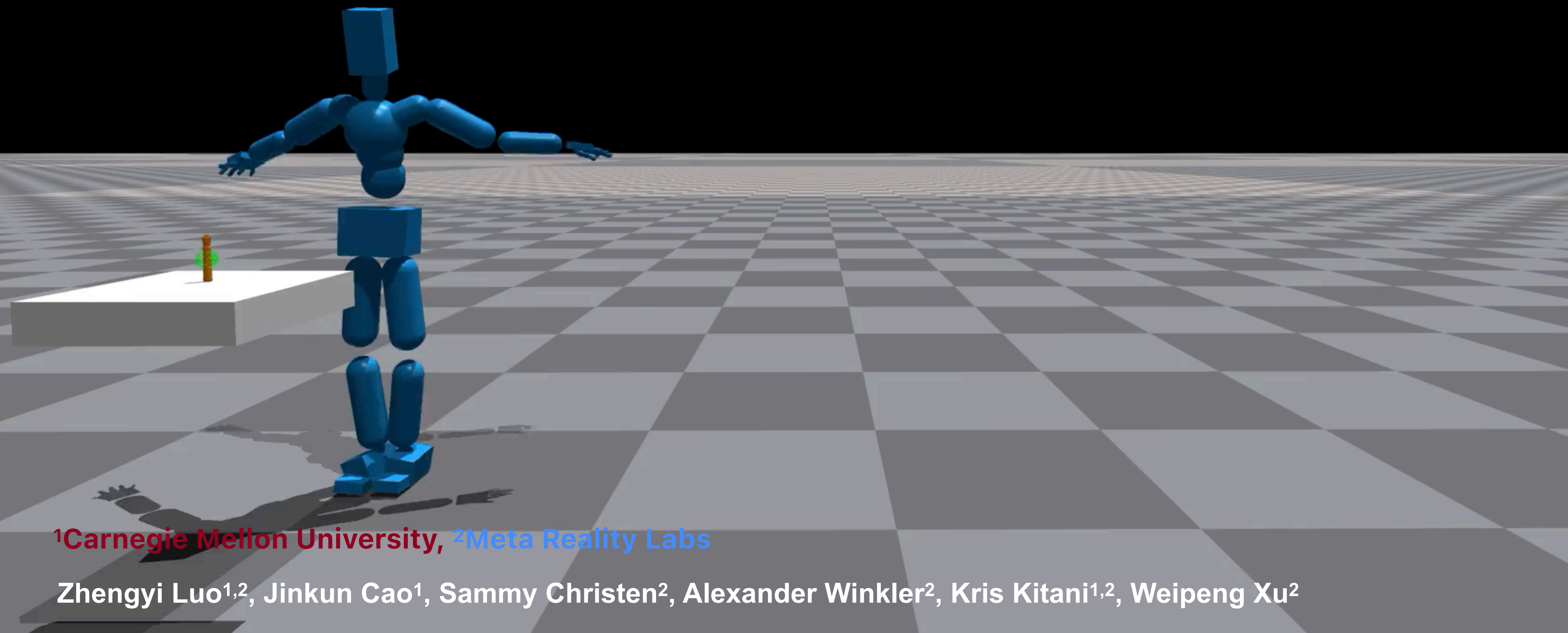








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