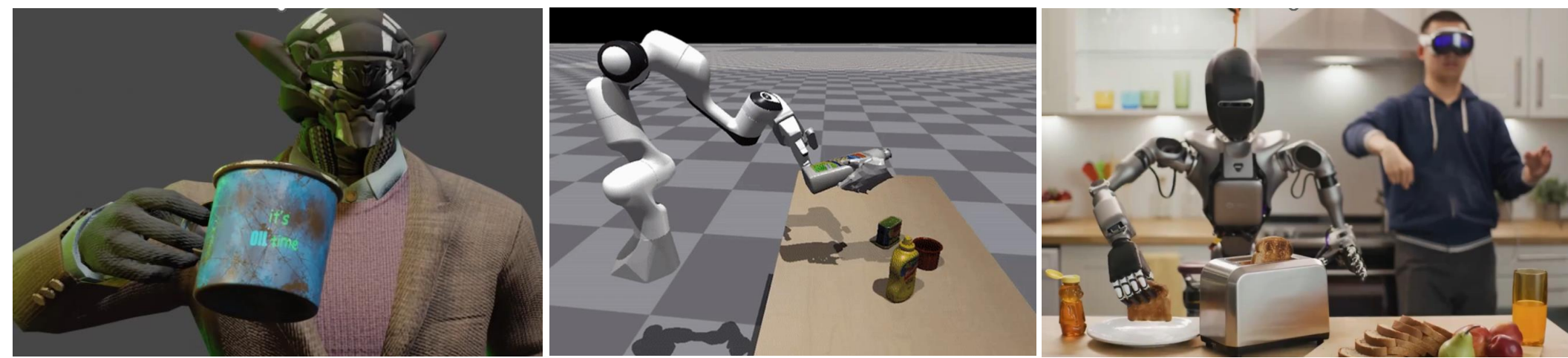


Overview

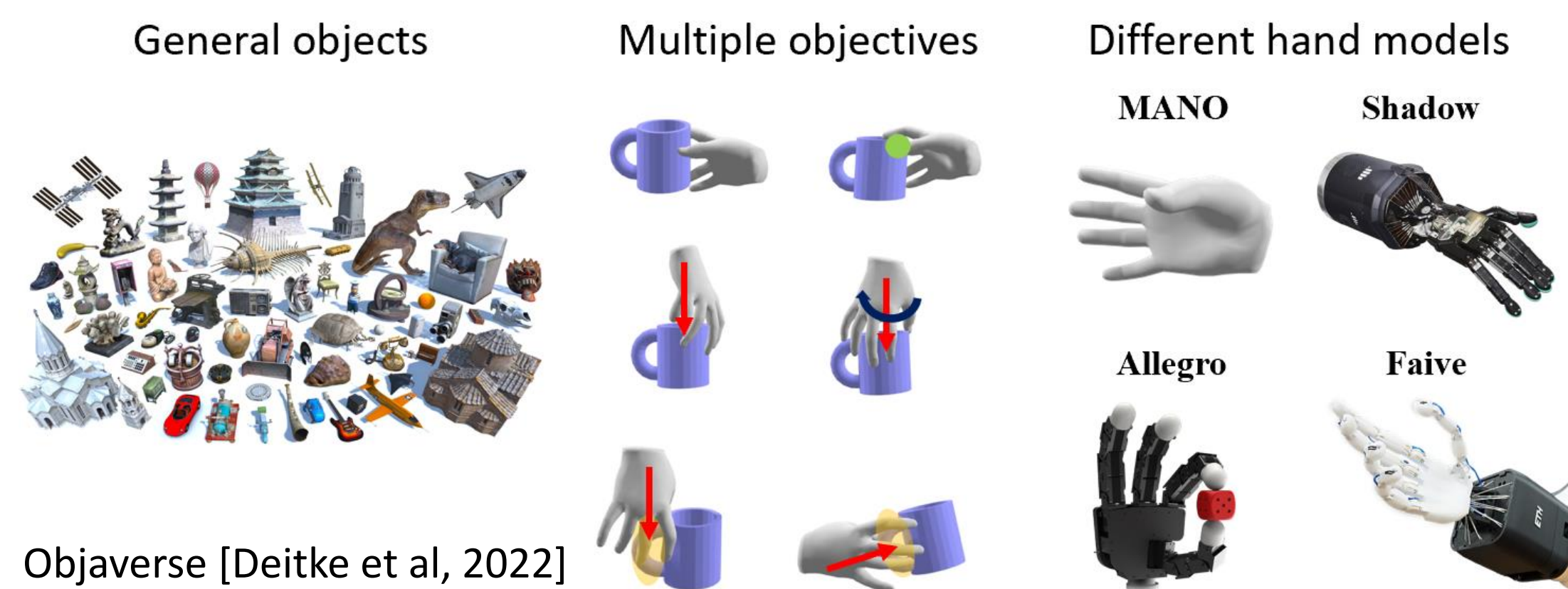
1 Motivation



[Blender] [Christen et al., 2023] [NVIDIA GROOT]

- Animation
- Simulate human motion
- Expert data for robots
- Expensive
- Not scalable
- Not real-time & adaptive

2 Task: objective-driven grasping motion synthesis

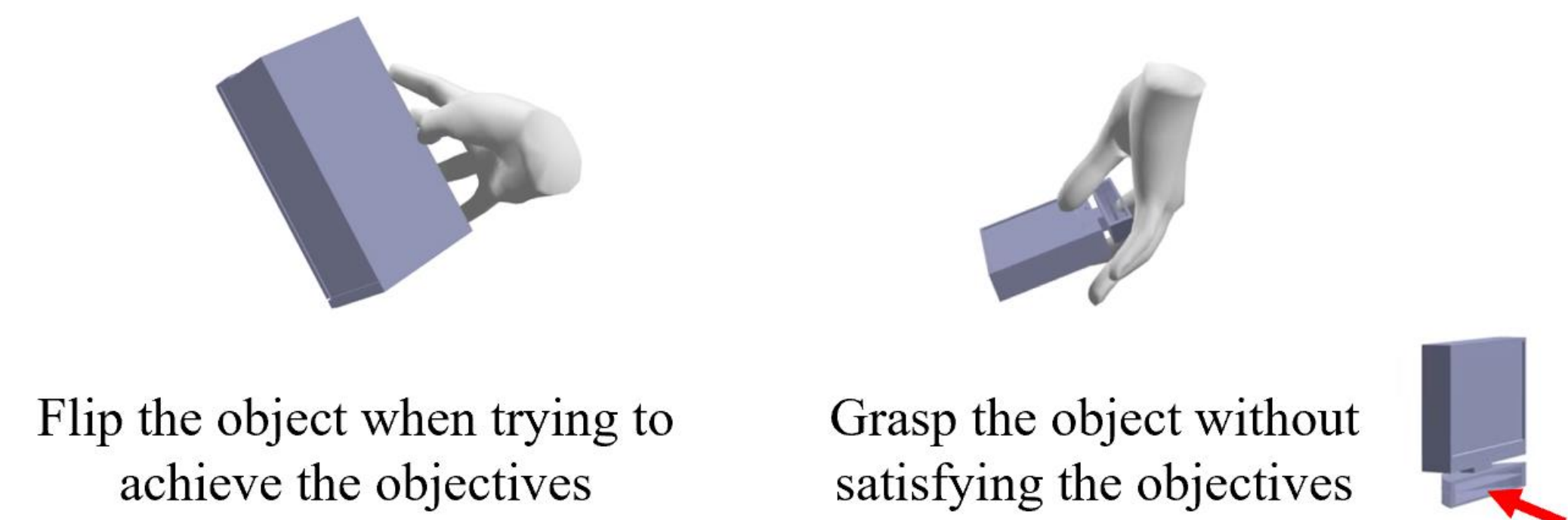


Objaverse [Deitke et al, 2022]

3 Challenges

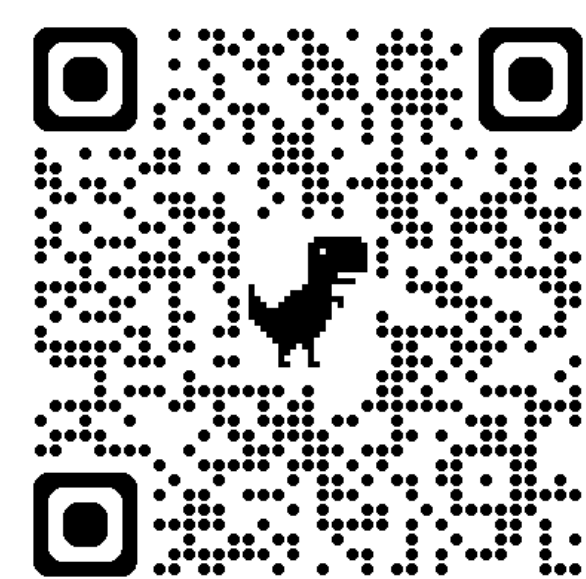
Challenge: Generalization
Question: A general framework for objects, hands, and motions?

Challenge: Precise objectives V.S. Stable grasping



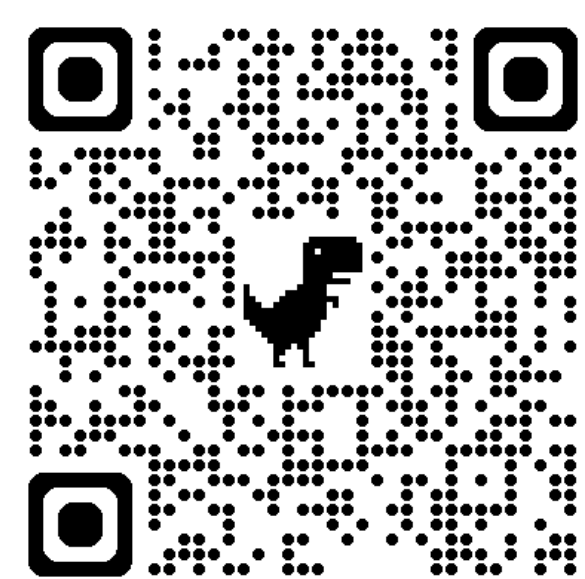
Question: Stable grasping + adhering to objectives?

Personal Homepage



Correspondence

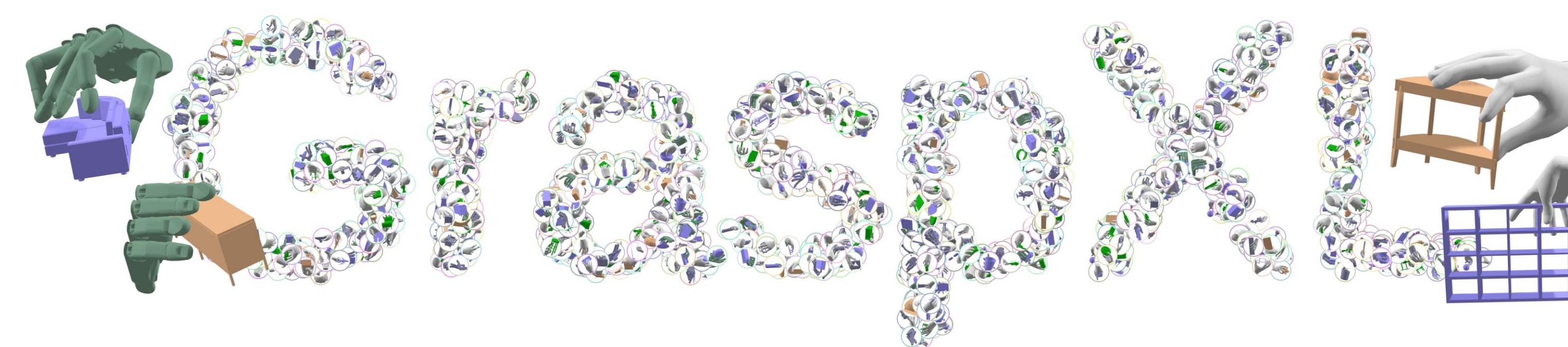
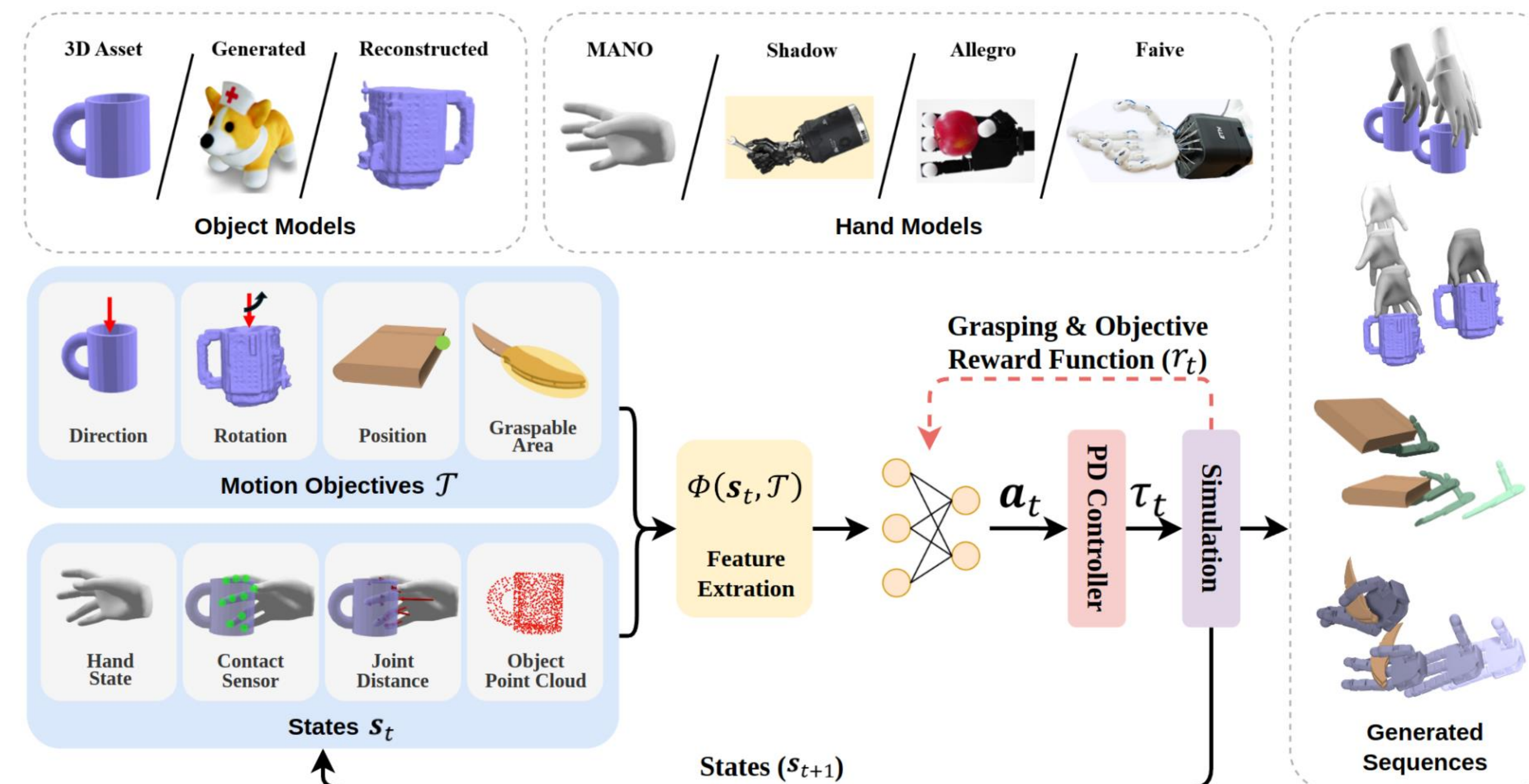
Project Page



huizhang@ethz.ch

Framework

1 Framework: Reinforcement Learning + Physics Simulation

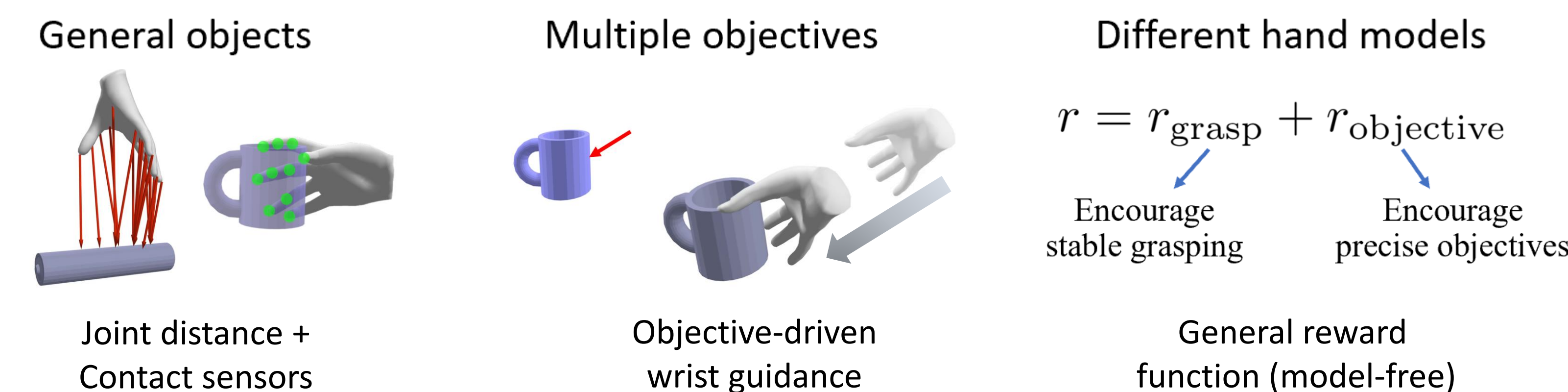


Dataset released!

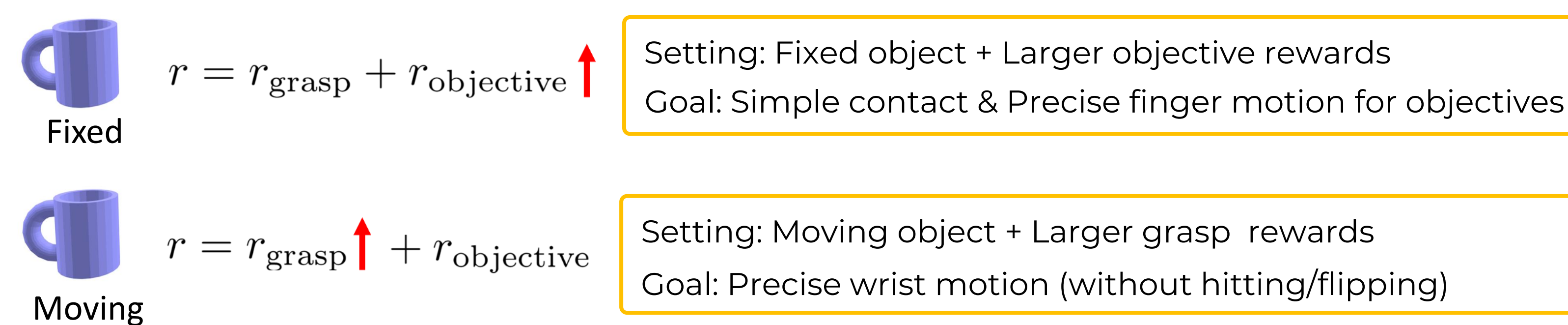
Diverse grasping motions for 500k+ objects of different hands

Method

1 General pipeline (Challenge 1)



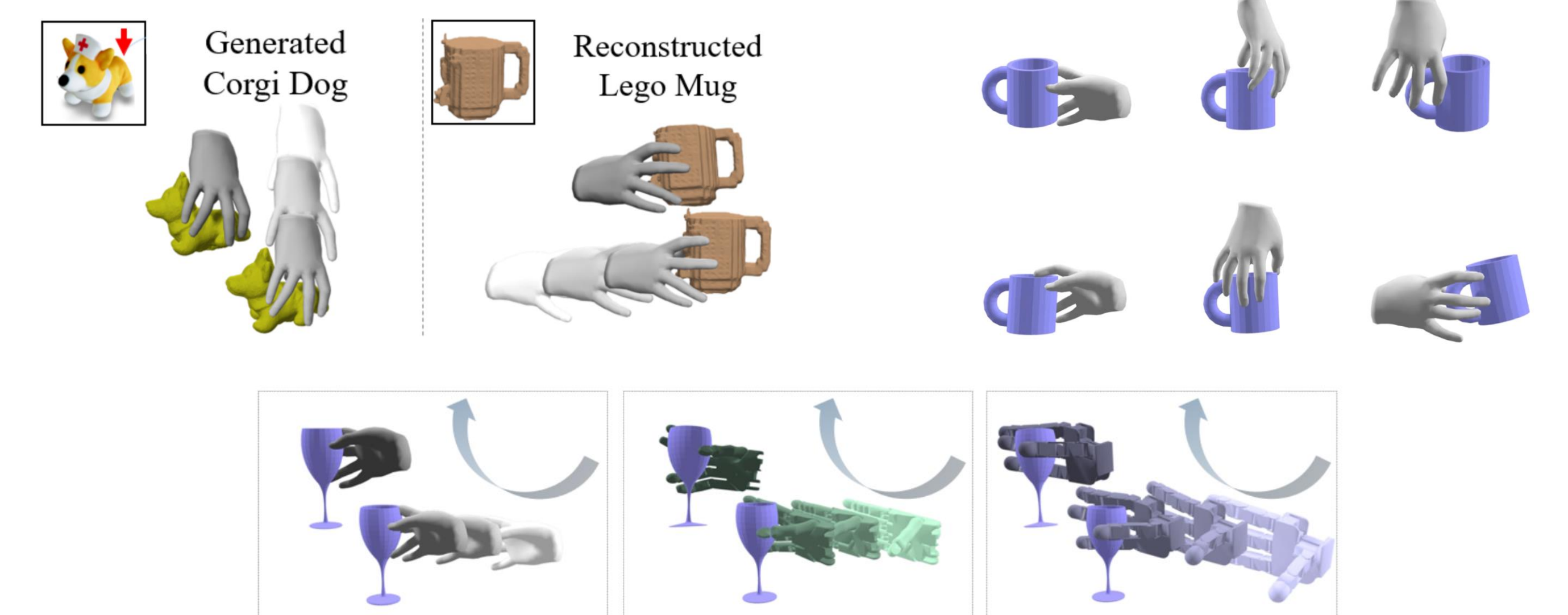
2 Learning curriculum (Challenge 2)



Results

1 Generated motions

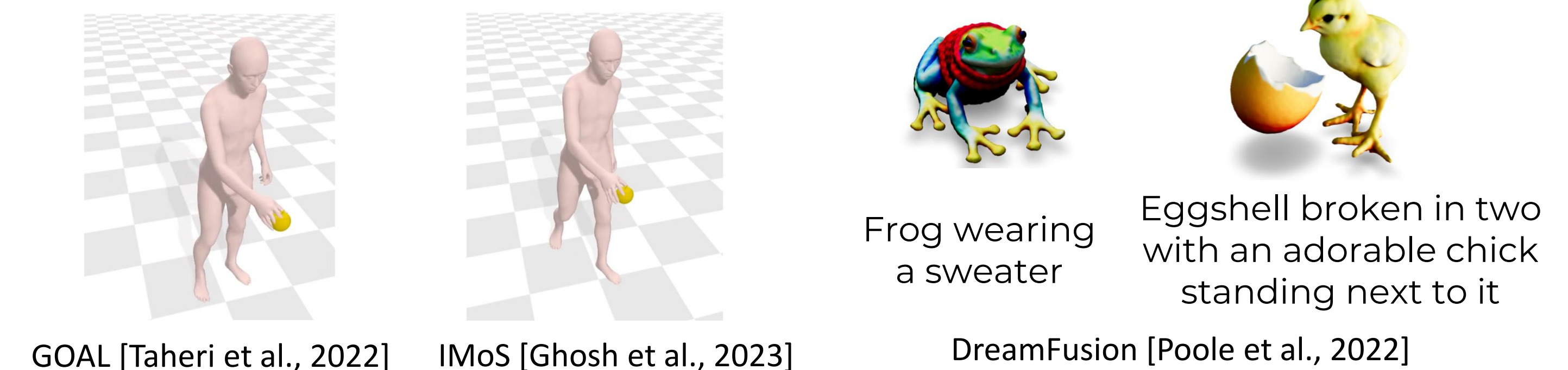
- 500k+ objects
- Generated/reconstructed objects
- Different objectives
- Different dexterous hands



Applications

What can we do with the method (requiring no 3D data but **only meshes**) and dataset (a **large scale of 3D grasping motions**)

1 Motion generation



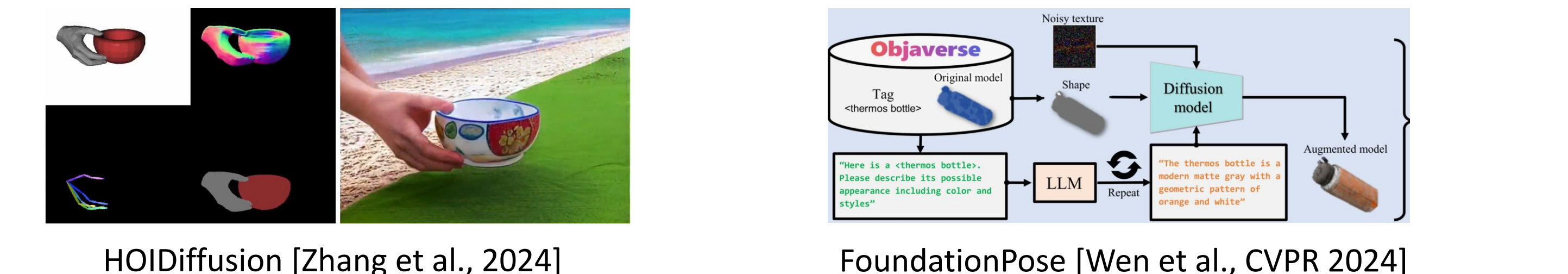
GOAL [Taheri et al., 2022] IMoS [Ghosh et al., 2023]

DreamFusion [Poole et al., 2022]

As a plug-in for whole-body motion generation methods (Animation)

Zero-shot text-to-motion generation (with text-to-mesh methods)

2 3D vision

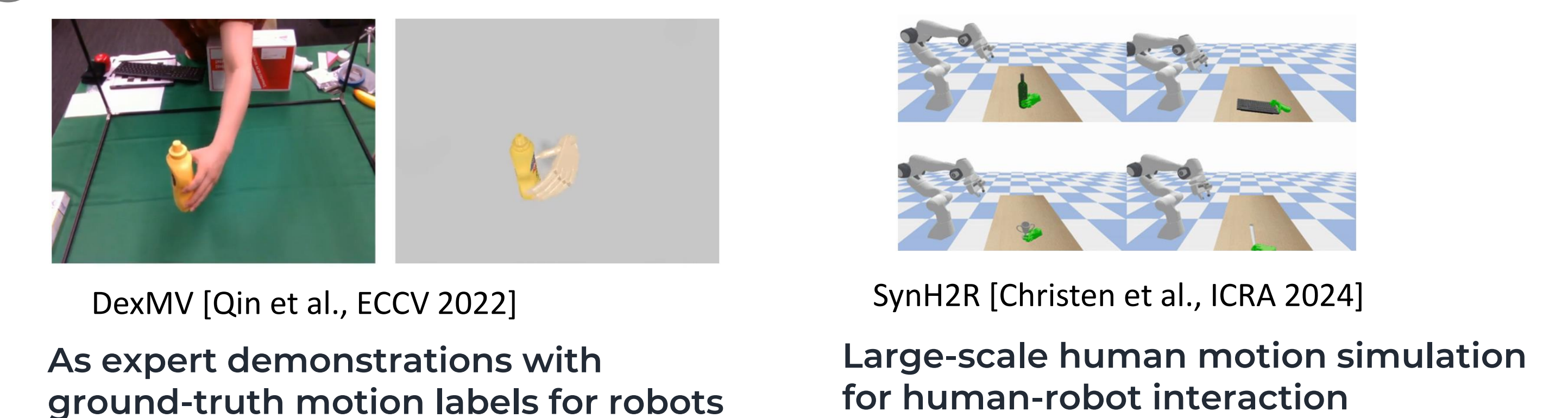


HOI Diffusion [Zhang et al., 2024]

FoundationPose [Wen et al., CVPR 2024]

Large scale of pseudo-real RGBD grasping motion data with ground-truth 3D labels (with texture generation methods) and downstream applications

3 Robotics



DexMV [Qin et al., ECCV 2022]

SynH2R [Christen et al., ICRA 2024]

As expert demonstrations with ground-truth motion labels for robots

Large-scale human motion simulation for human-robot interaction