

Closed-loop 6D Robotic Grasping of Unseen Objects



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TEROS

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Why is Robotic Grasping Challenging?

Example: Picking up a mug



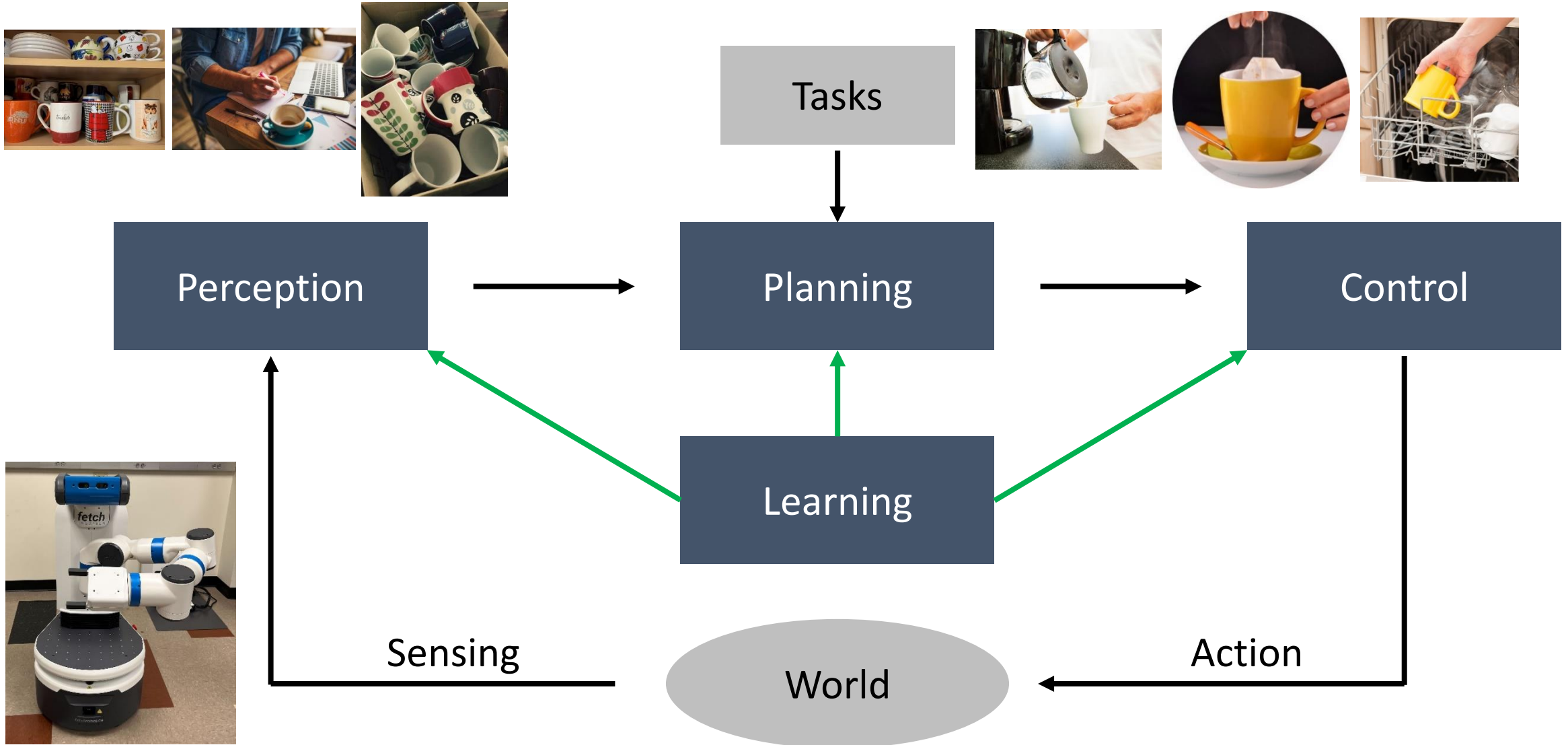
Environment Diversity



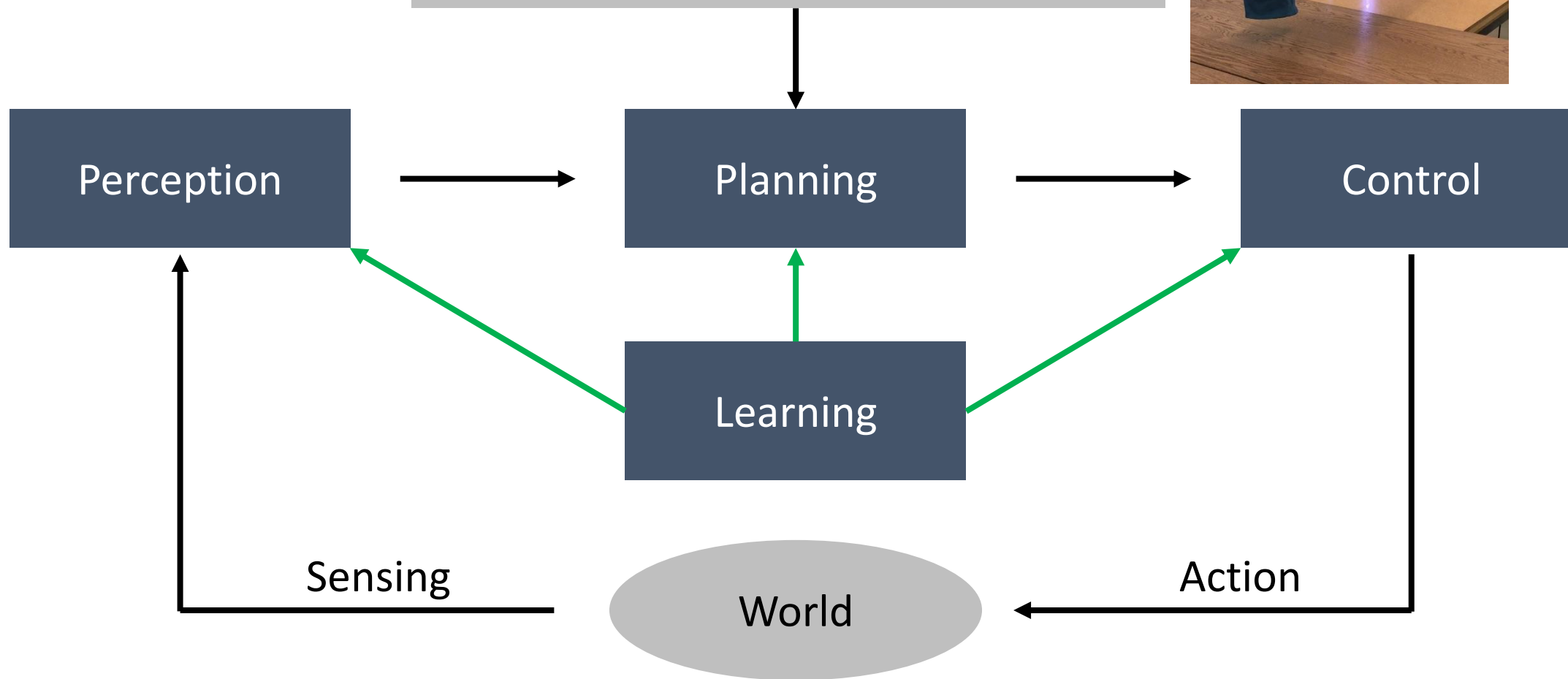
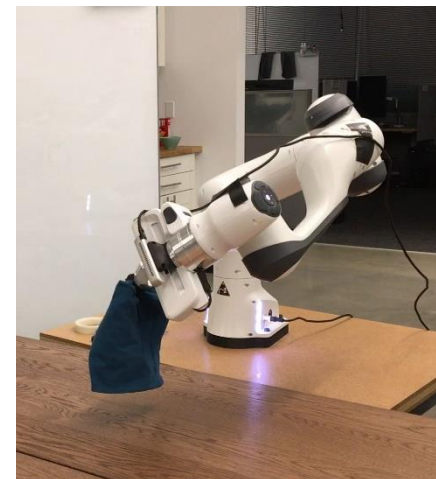
Task Diversity



The Perception, Planning and Control Loop



Task: 6D Robotic Grasping



Model-based 6D Robotic Grasping

Perception

Planning

Control

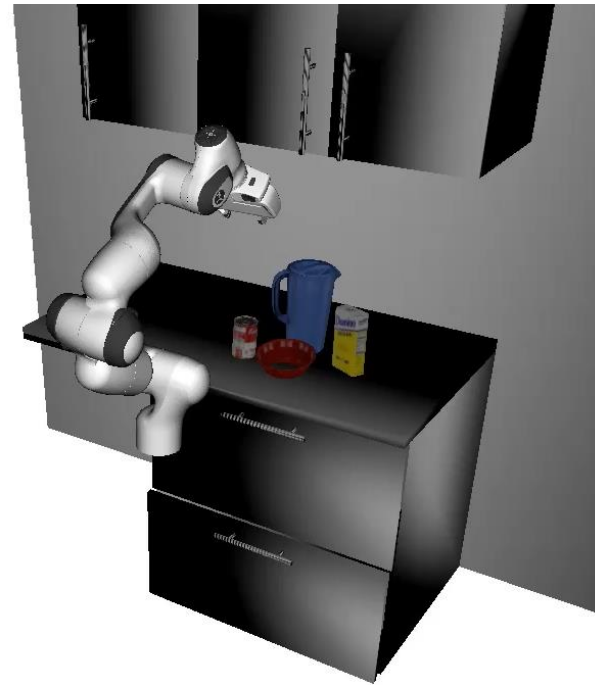
6D Object Pose Estimation

Manipulation
trajectory planning

Manipulation
trajectory following



- Require 3D models of objects



- Open-loop

6D Grasping of Unseen Objects

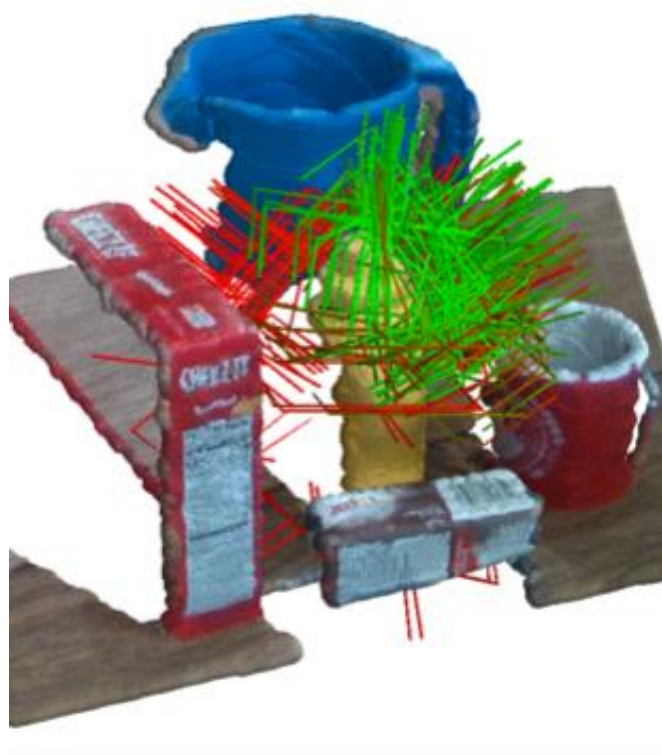
Perception

Unseen object instance
segmentation



Planning

Grasp planning
from point clouds

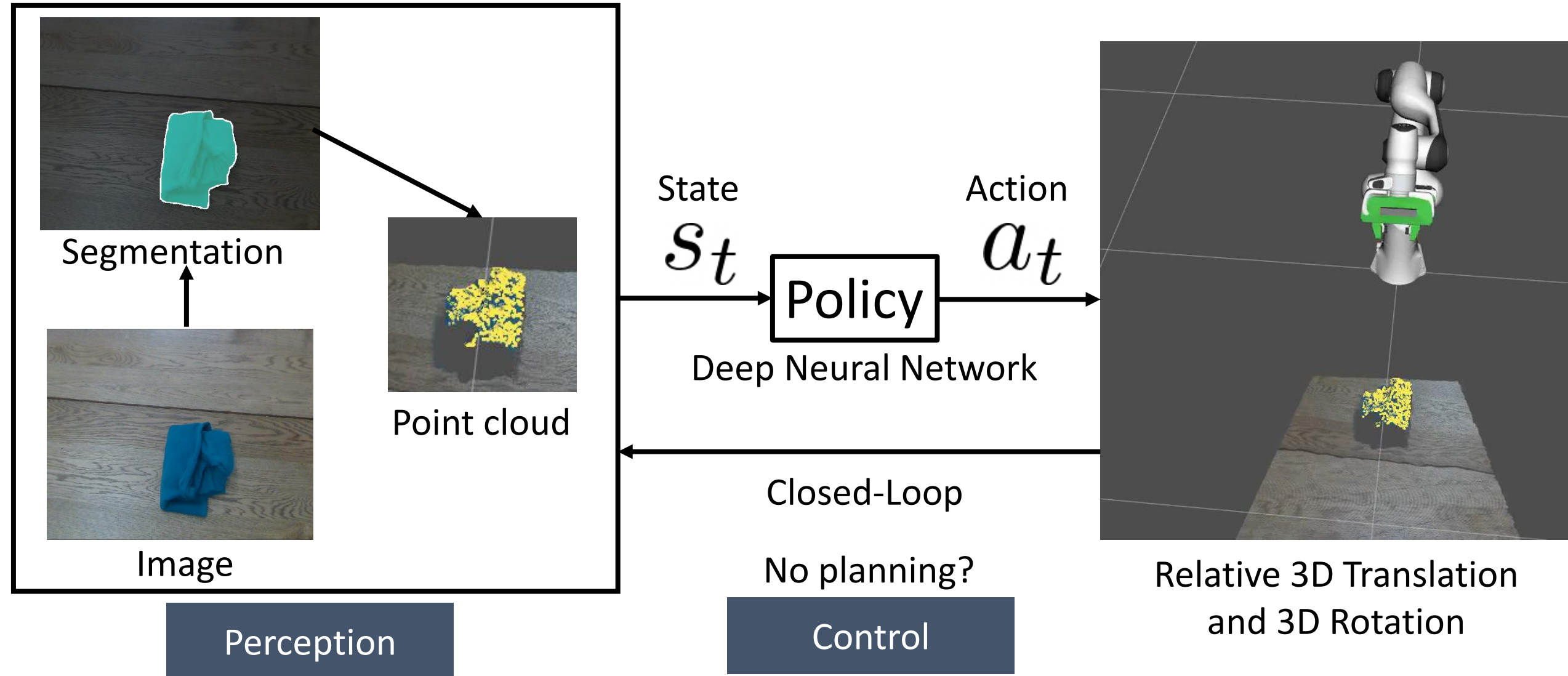


Control

Manipulation
trajectory following



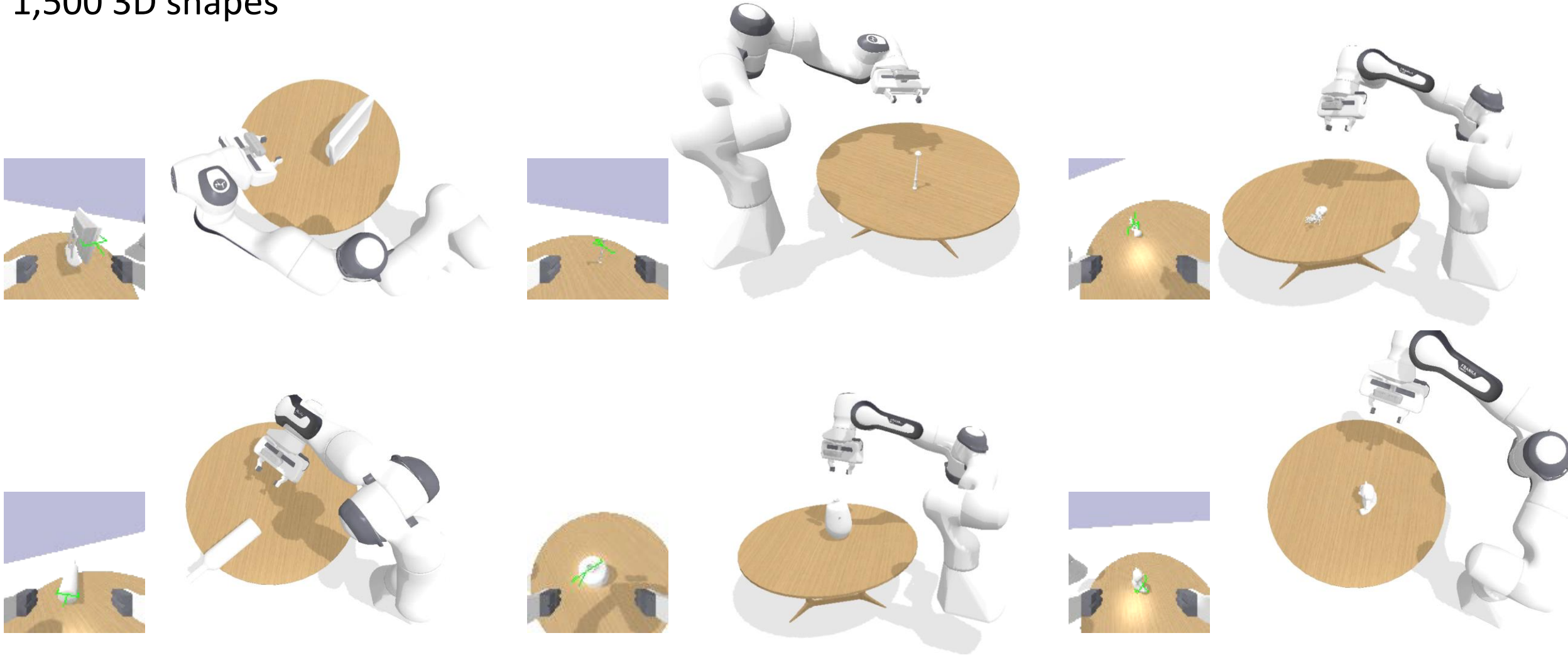
Learning Closed-Loop Control Policies for 6D Grasping



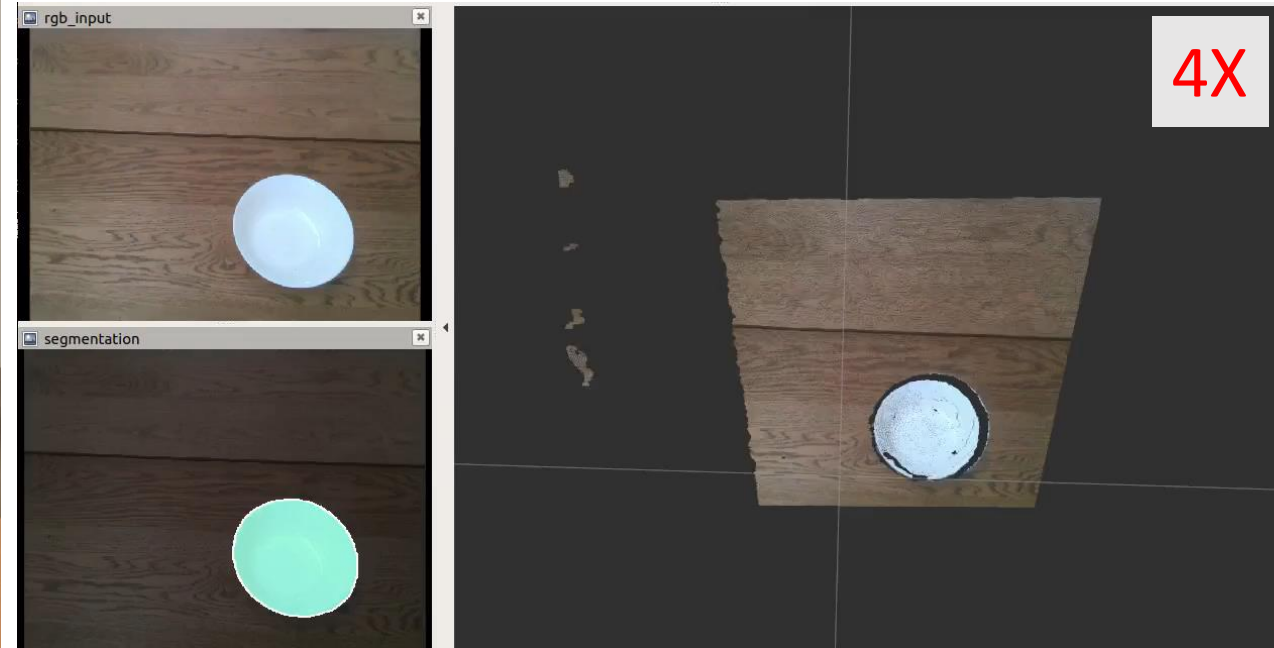
Learning from Demonstration with the OMG-Planner

50,000 trajectories

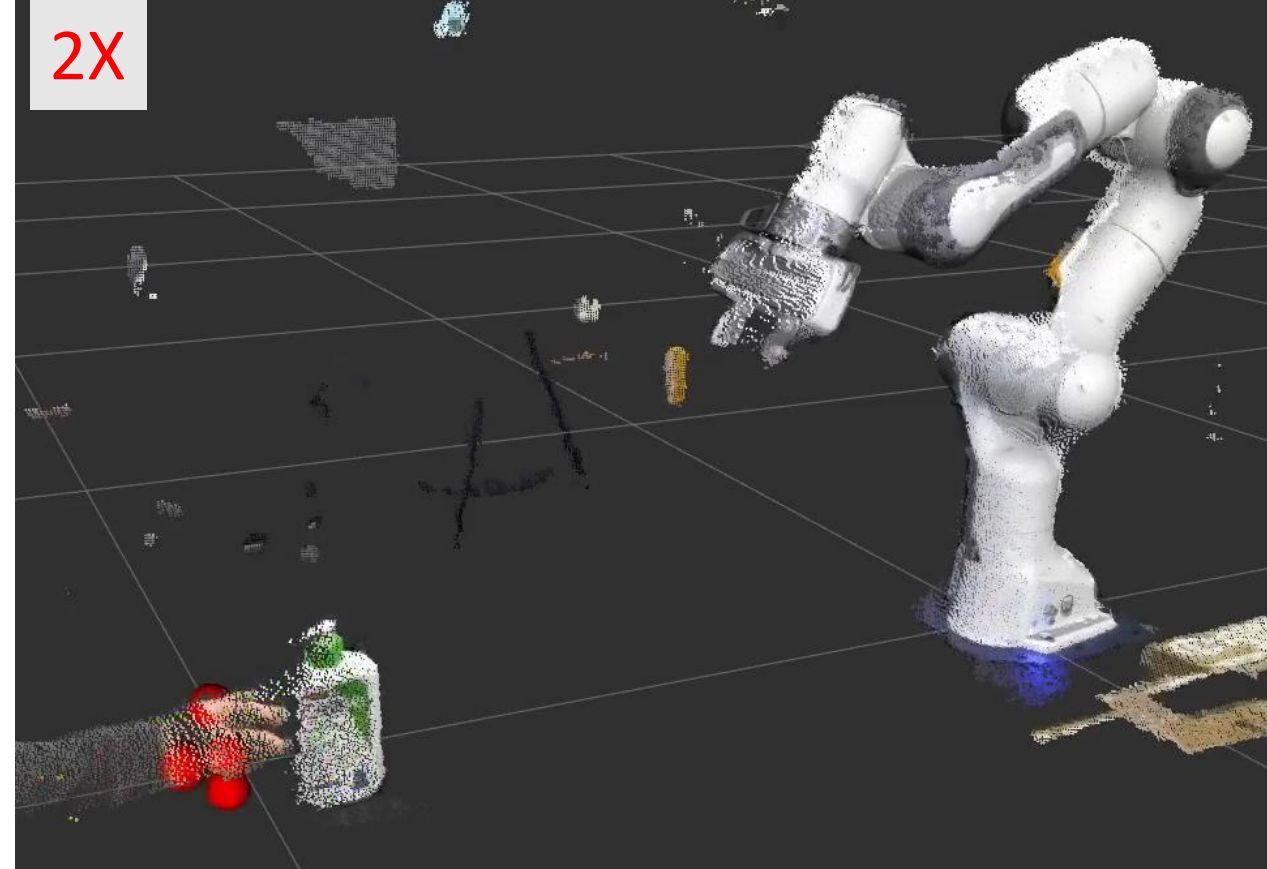
1,500 3D shapes



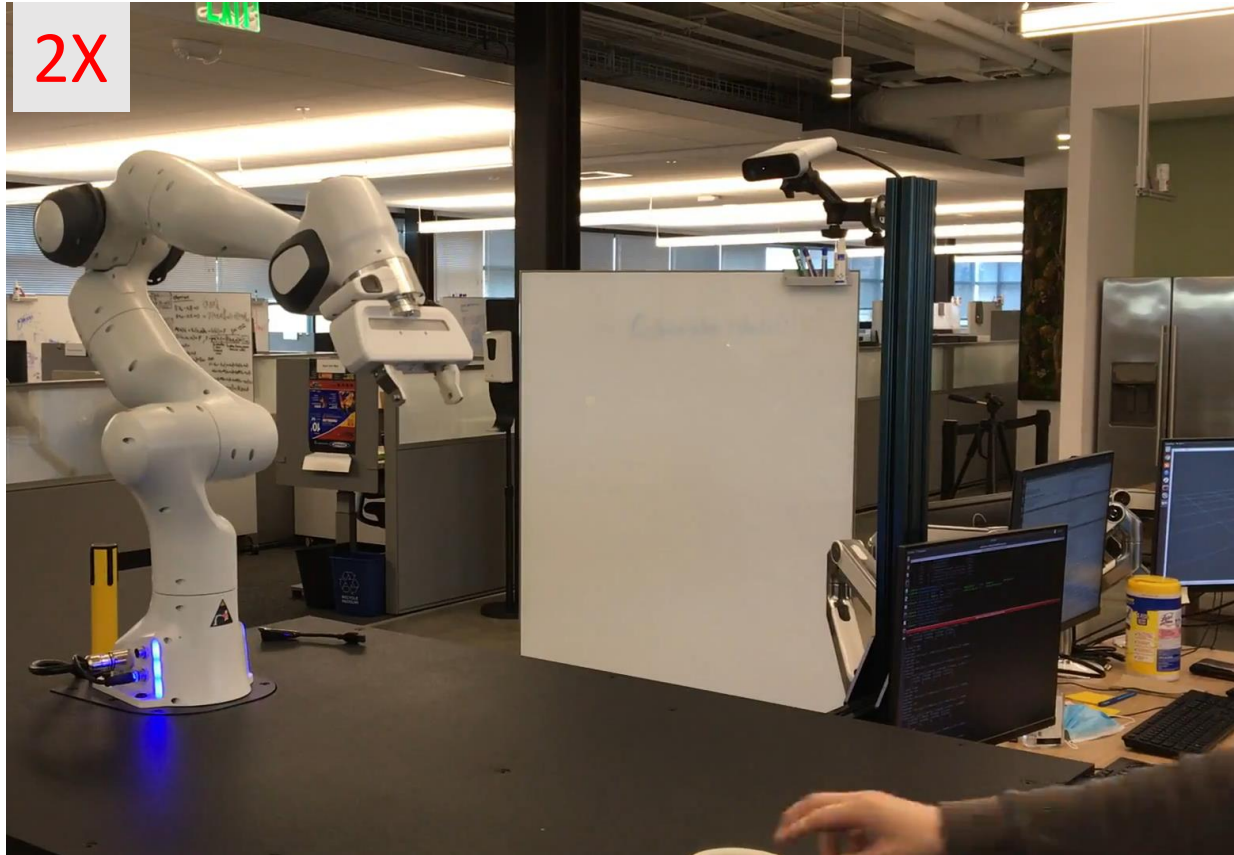
Our Learned Policy in the Real World



Closed-Loop Human-Robot Handover



Closed-Loop Human-Robot Handover



Closed-Loop 6D Grasping in Cluttered Scenes



Intelligent Robotics and Vision Lab

Robot Skills **Generalizable and Shareable**

Perception

Planning

Control

Learning

Deploy



Improve

Robotic Systems



Intelligent Robotics and Vision Lab



<https://labs.utdallas.edu/irvl/>

Assisted by
Ms. Rhonda Walls

Thank you!