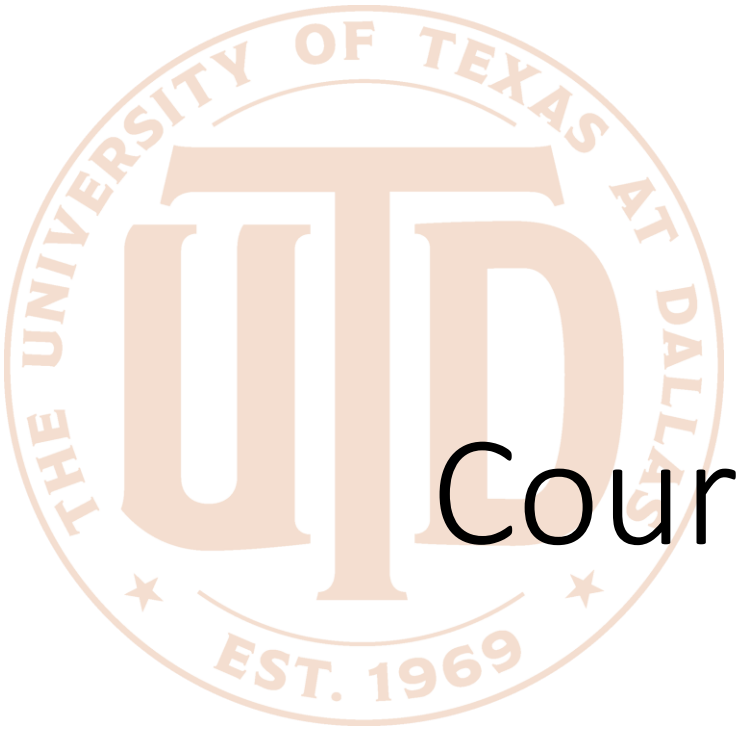


Course Project Description

CS 6341 Robotics

Professor Yu Xiang

The University of Texas at Dallas

Robot Hardware: SO101 Arm

https://github.com/TheRobotStudio/SO-ARM100

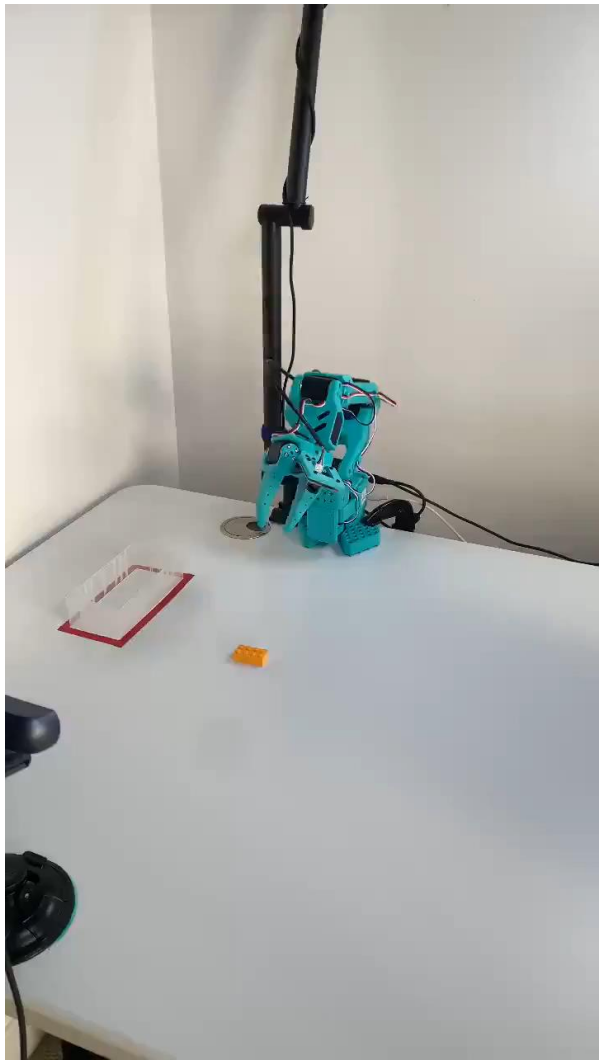
Course Project

- Team Project (45%)
  - 4 students for a project
  - Project proposal (5%)
  - Project mid-term report (10%)
  - Project presentation (20%): **in-class demo with the SO101 arm**
  - Project final report (10%)

Course Project Tracks

- Research-oriented
  - Proposal a new idea in robotics that has not been explored before
  - Implement the new idea and conduct experiments to verify it
- Application-oriented
  - Apply an existing algorithm or method to a new problem or a new application
  - E.g., if a method is proposed for domain A, explore applying it to a different domain
- Implementation-oriented
  - Select an existing algorithm or method, implement it and conduct experiments to verify the implementation
  - Cannot just use open-source code and run experiments with it

Example: Pick-and-Place

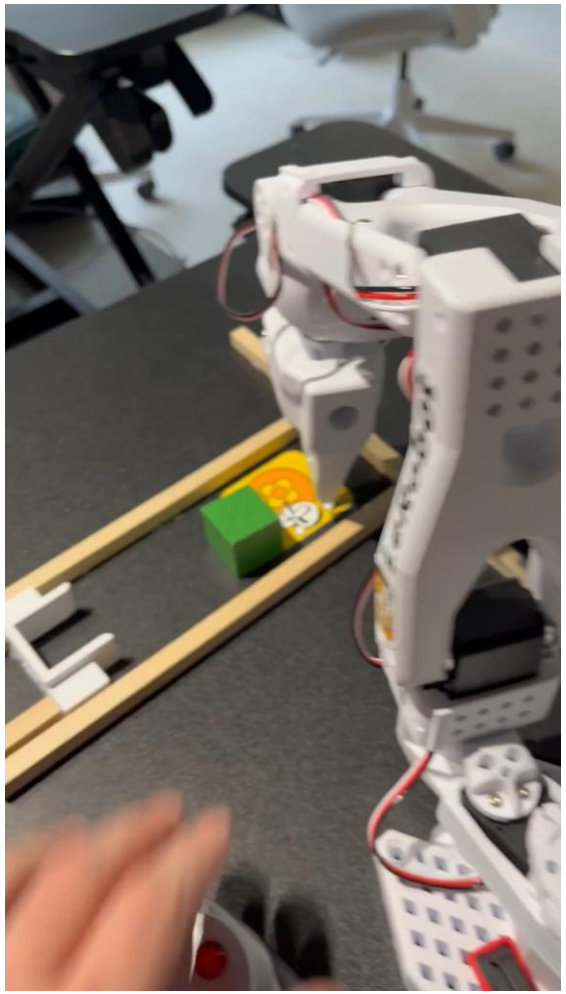


https://x.com/danaaubakir/status/1933546314731507982

Example: Pick-and-Place

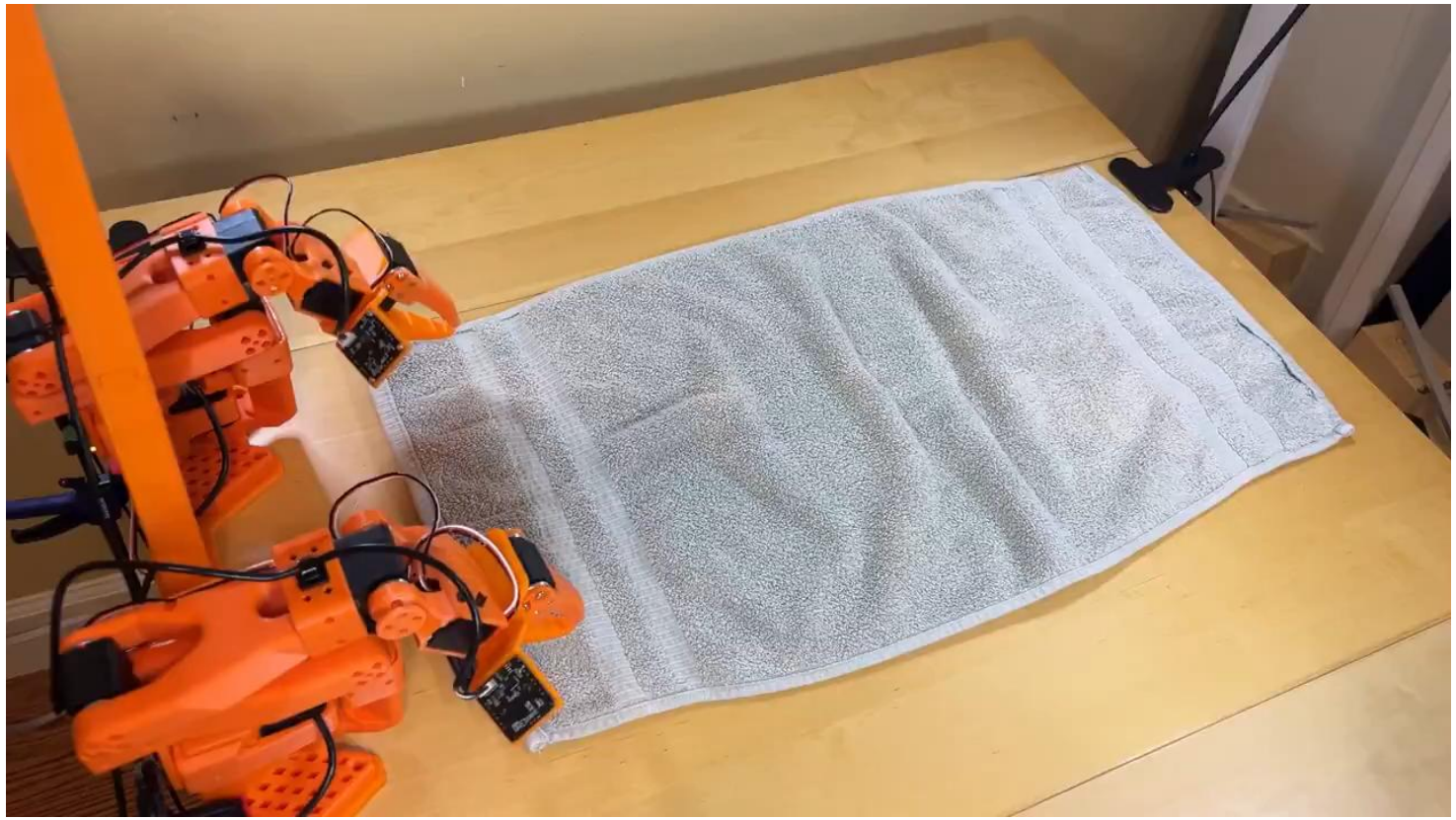
https://x.com/reach_vb/status/1932915717541683495

Example: Robot Pushing



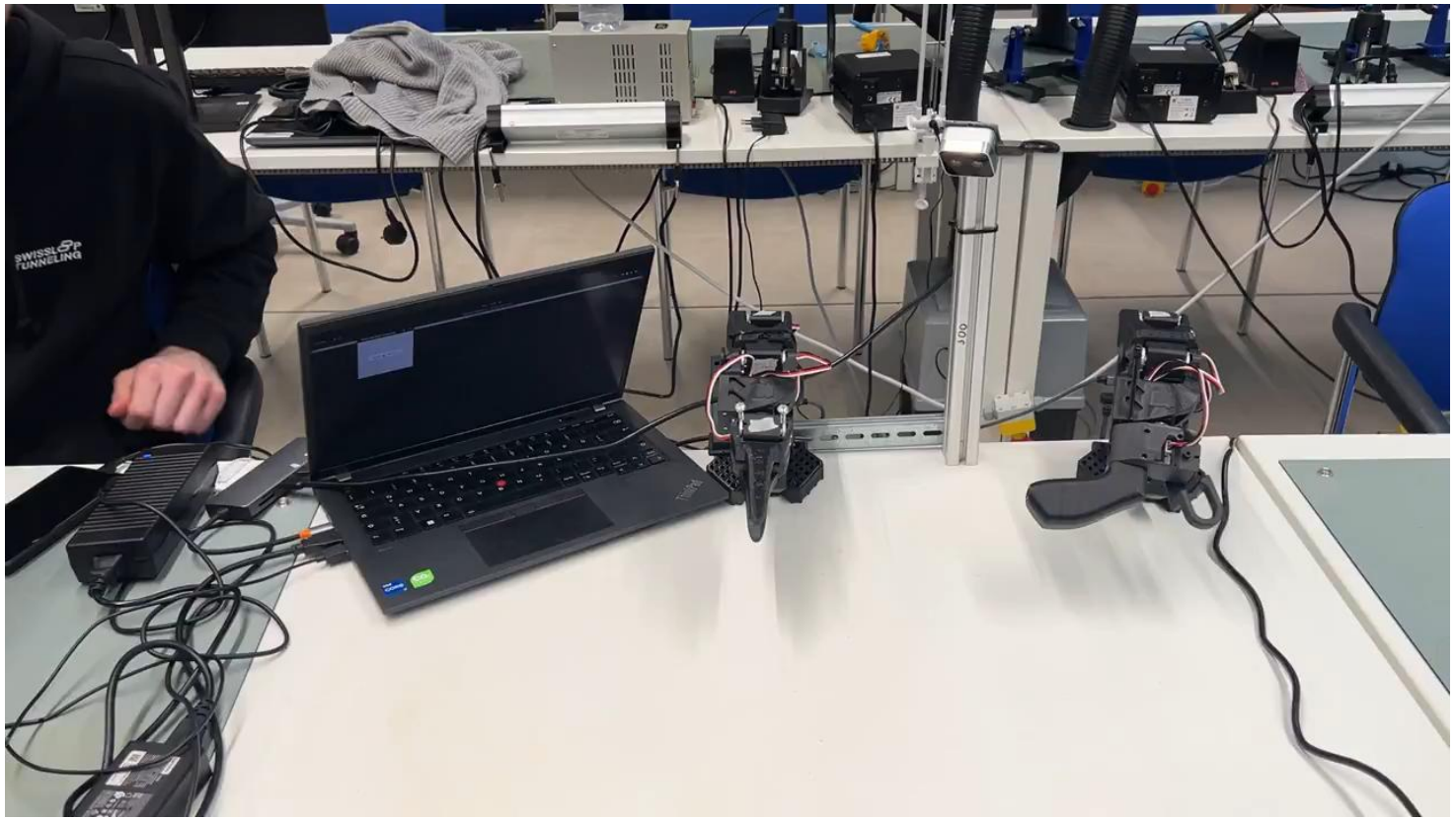
https://x.com/AdilZtn/status/1933523981778182625

Example: Folding Towel



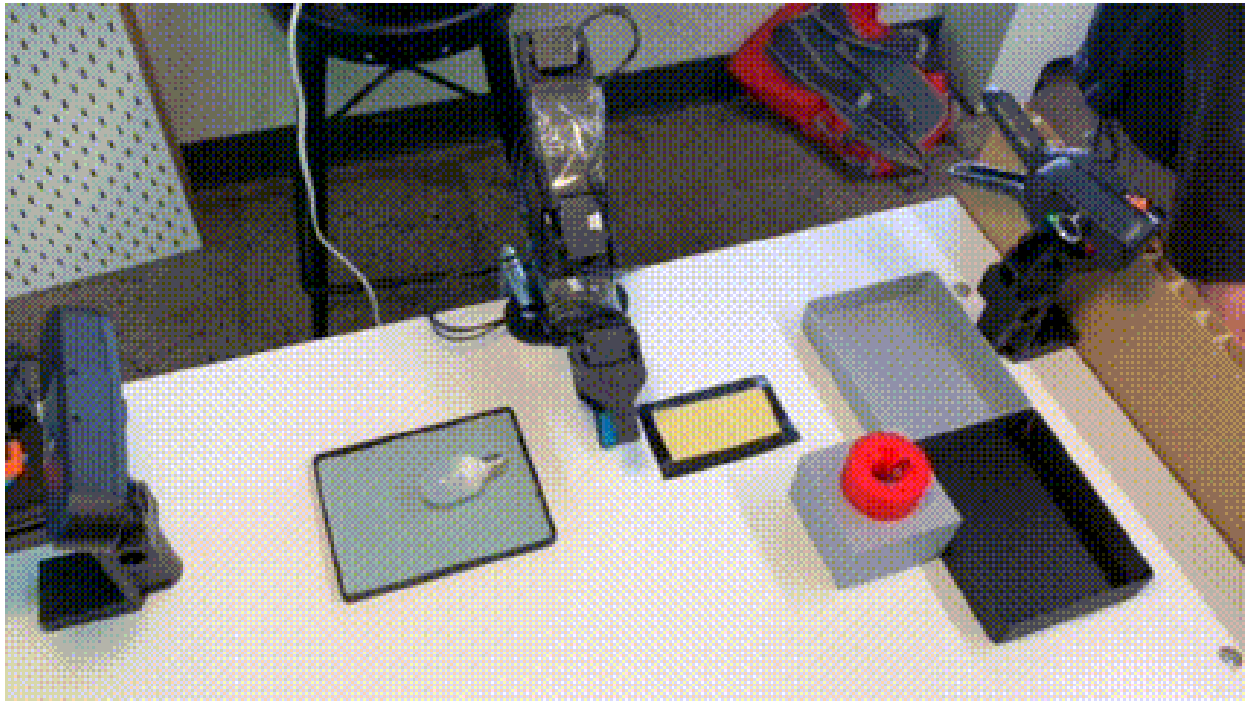
https://x.com/cmcgartoll/status/1909803805505368535

Example: Cleaning Table



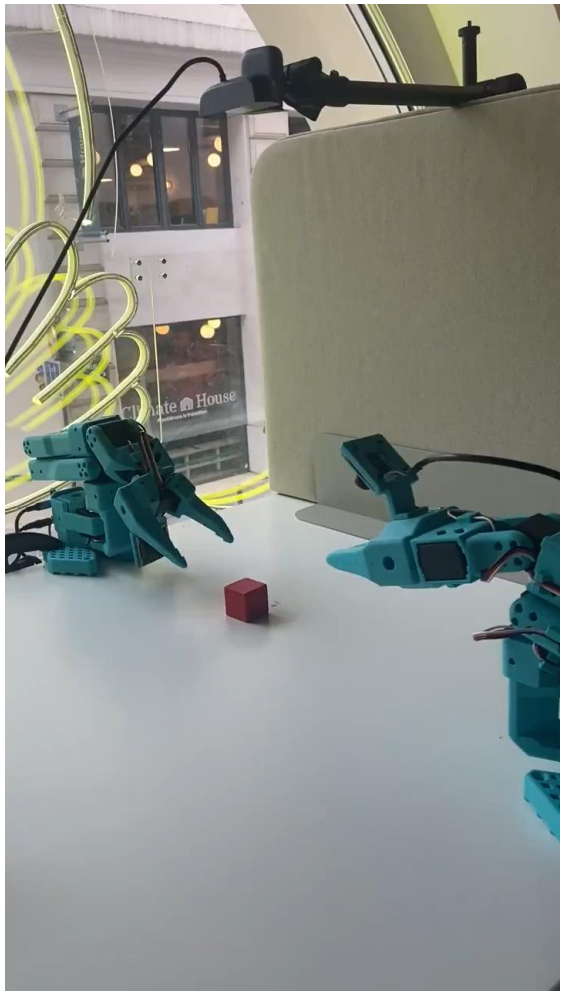
https://x.com/JannikGrothusen/status/1852790503823057073

Example: Peg-in-Hole



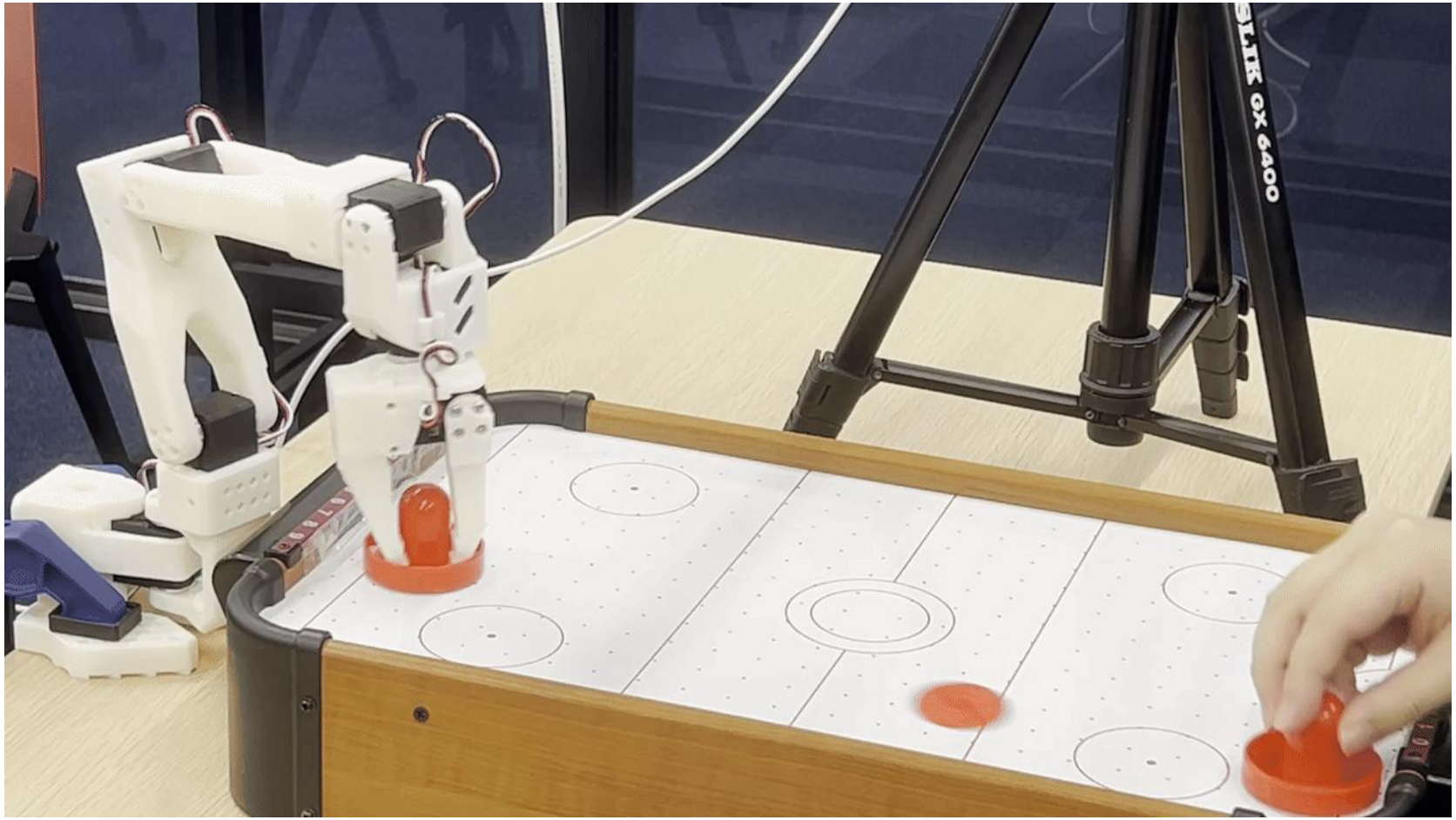
https://github.com/SimpleAutomationOrg/SimpleAutomation

Example: Robot-to-Robot Handover



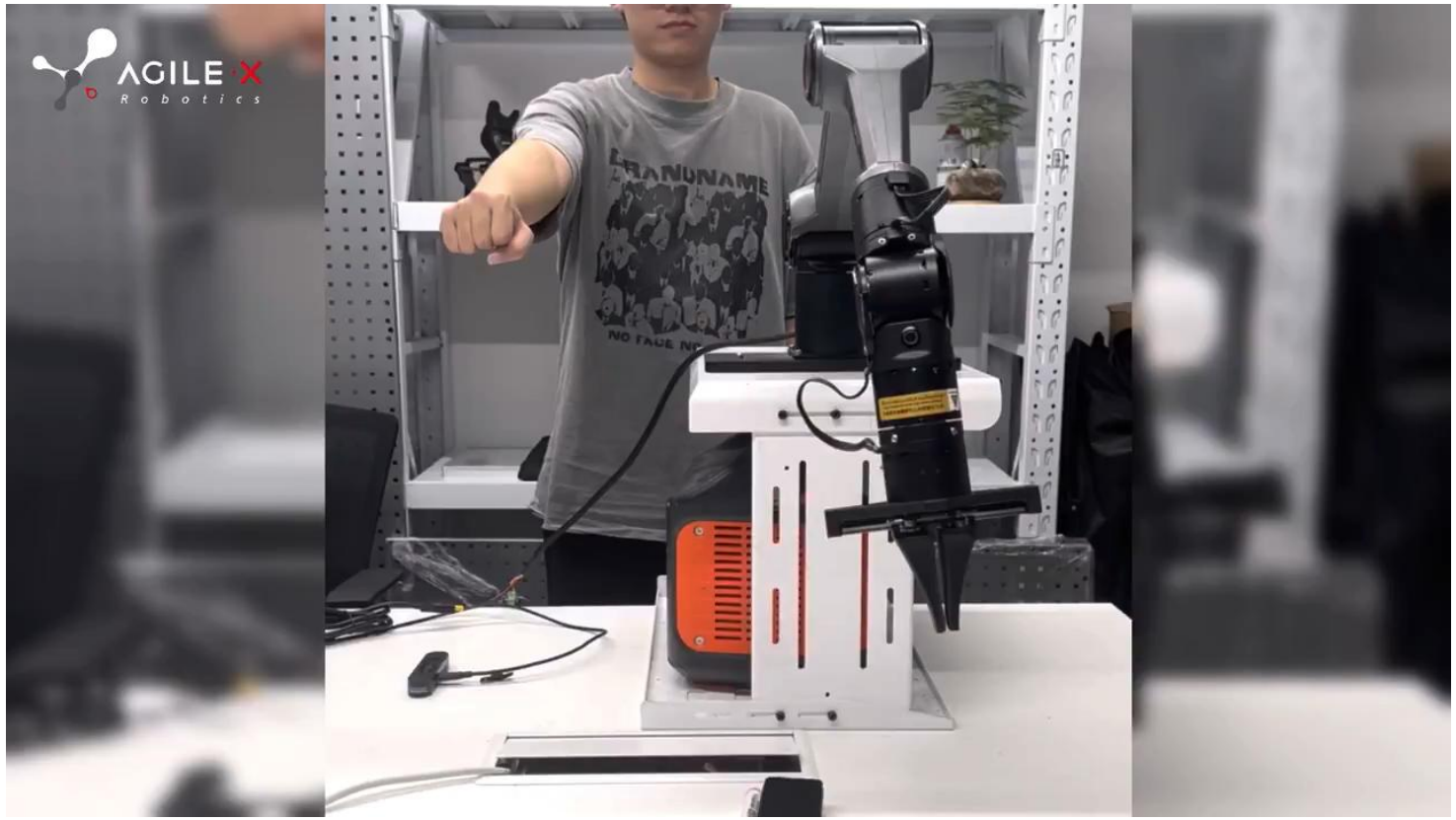
https://x.com/LeRobotHF/status/1945818023291482563

Example: Hocky



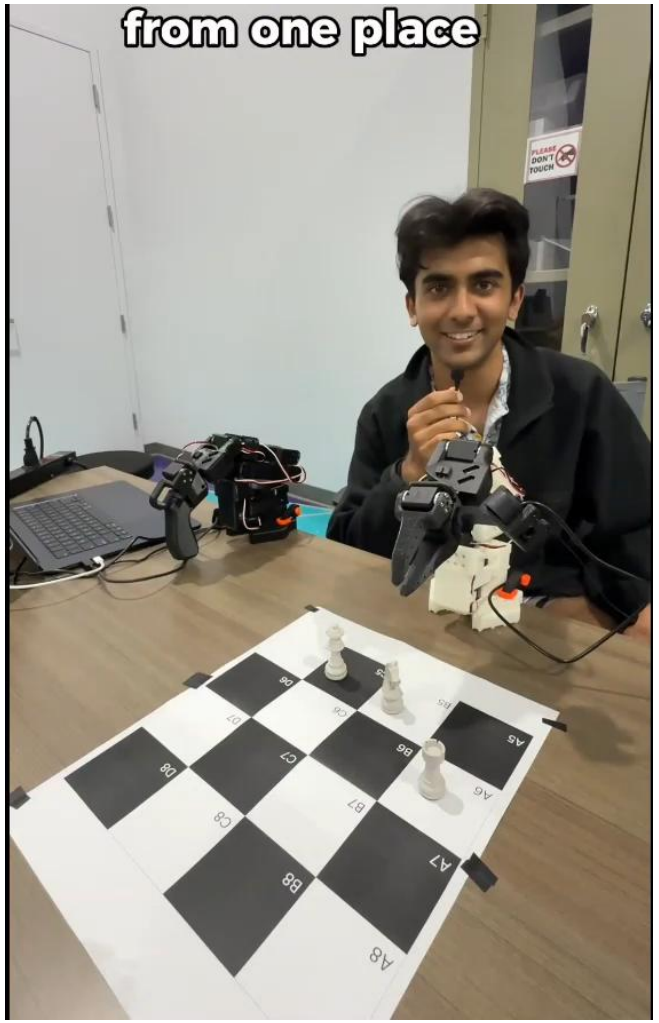
https://huggingface.co/datasets/LeRobot-worldwide-hackathon/134-npaka-studio-air-hockey

Example: Teleoperation



https://x.com/AgilexRobotics/status/1963886533381157333

Example: ChessBot



https://x.com/ahadj0/status/1934432727635484776

Example: Mobile Manipulation

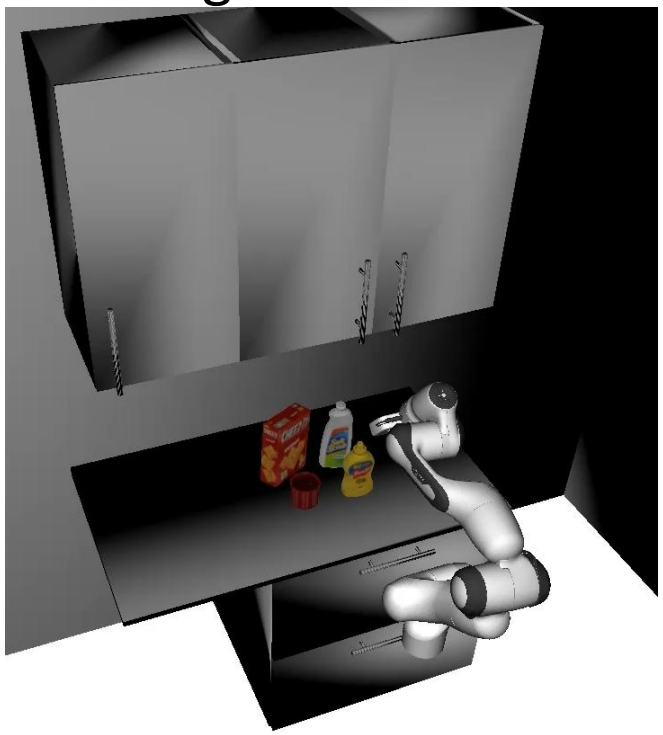
https://x.com/masato_ka/status/1962011448529625549

Paradigm 1: Model-based Manipulation

Perception → Planning → Control

Sensed image

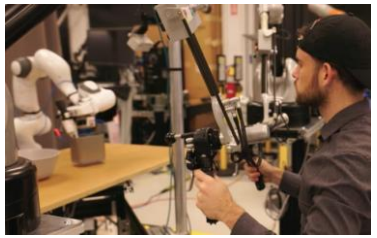
Planning scene



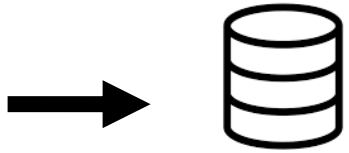
Real world execution

Paradigm 2: Learning-based Manipulation

Teleoperation

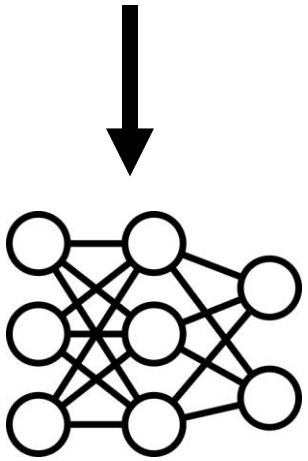


Collect Demonstrations



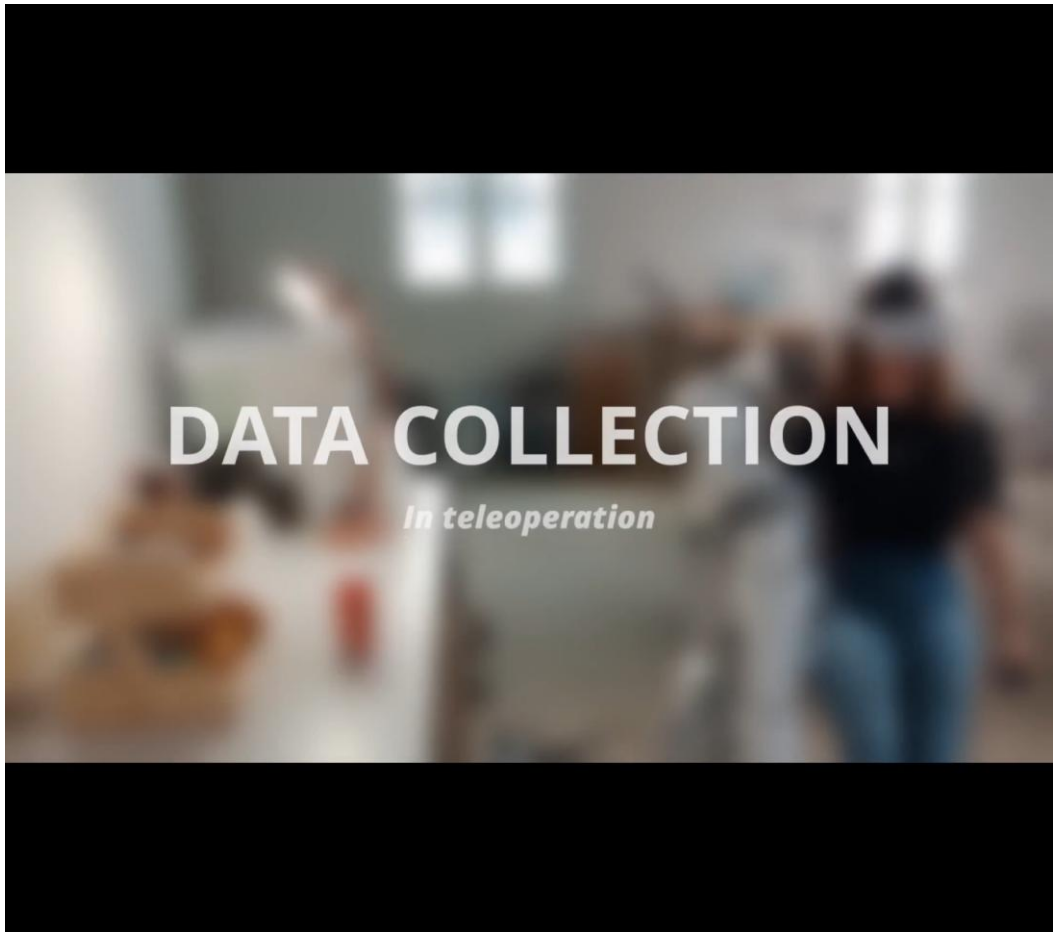
(state, action)

A Dataset of State-Action Pairs



Train a Policy Network

Deploy the Policy Network



https://x.com/LeRobotHF/status/1963893227708133763

Resources

- LeRobot homepage: https://github.com/huggingface/lerobot
- Pretrained models and datasets: https://huggingface.co/lerobot
- SmolVLA: Efficient Vision-Language-Action Model trained on Lerobot Community Data: https://huggingface.co/blog/smolvla
- SO101 arm with ROS2: https://github.com/Pavankv92/lerobot_ws
- Search more online…

Propose Your Projects

- Which track is your project?
  - Research-oriented? Application-oriented? Implementation-oriented?
- What task you want the SO101 arm to do?
  - **Novelty**
- Will you do model-based or learning-based?

Demo time and Discussion

TA: Luis Felipe Casas Murillo