humanoid collective

robocasa

humanoid collective vol 4

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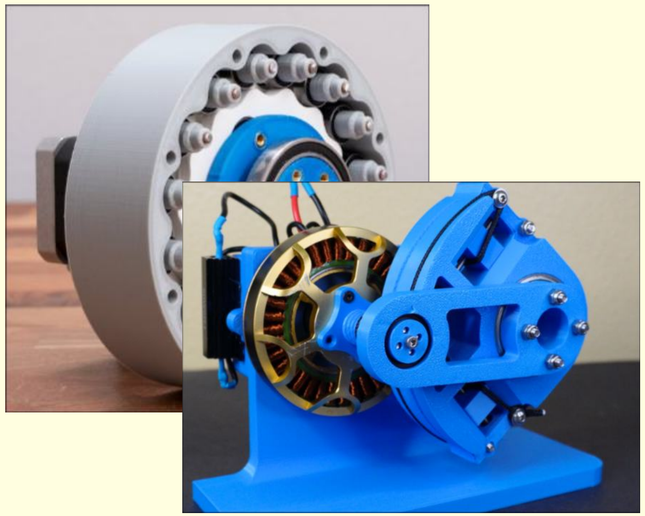
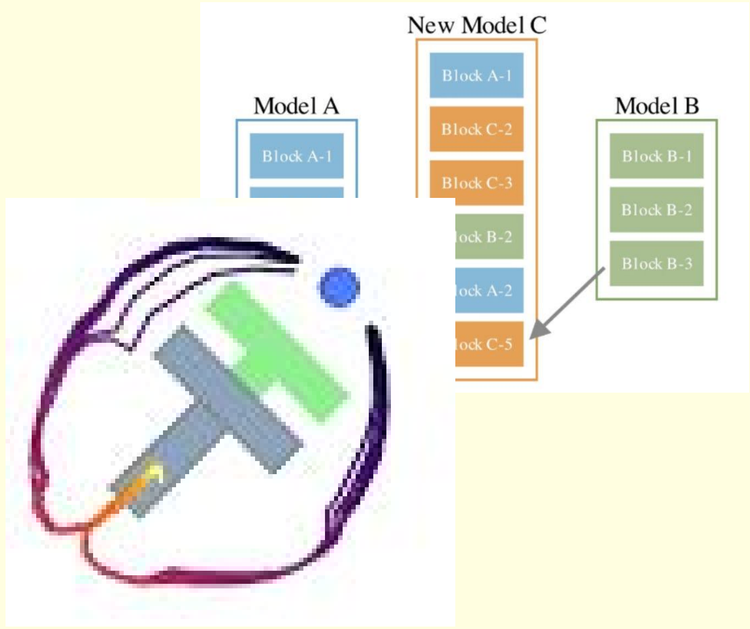
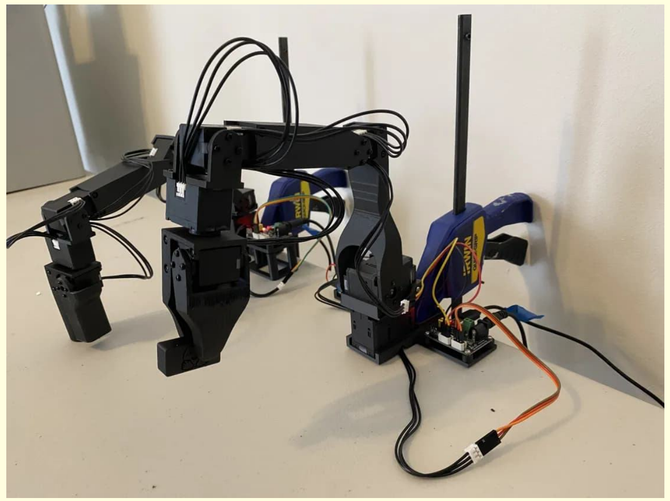
new projects!



actuator prototypes



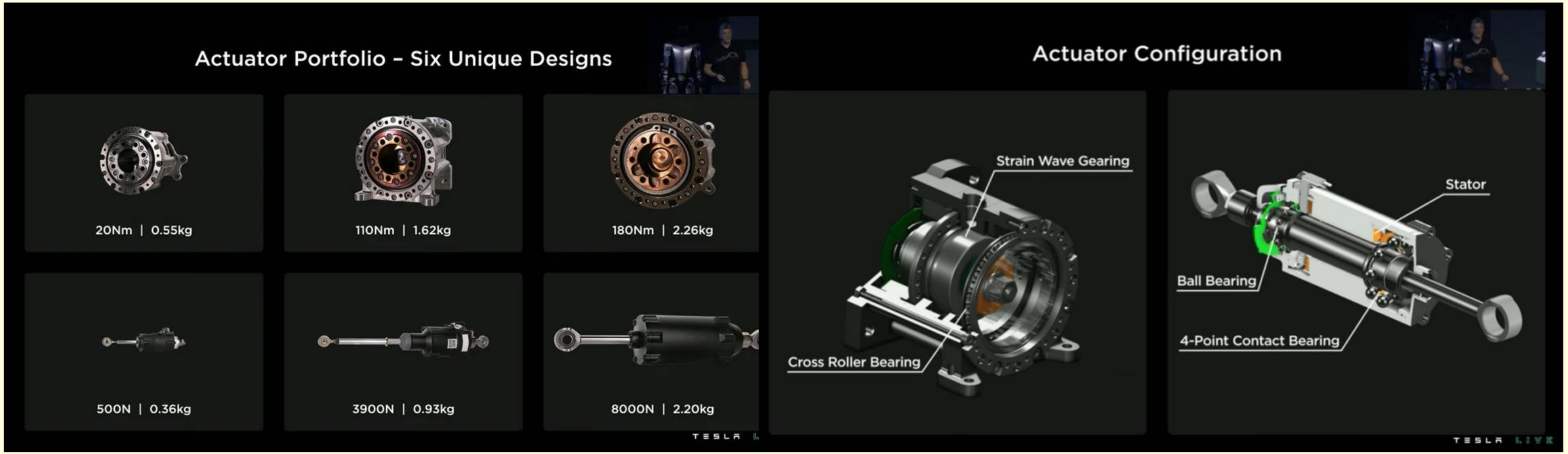
diffusion policy model merging



lerobot teleoperation

humanoid collective

actuators 101



we need data!

but collecting data in the real world is hard...

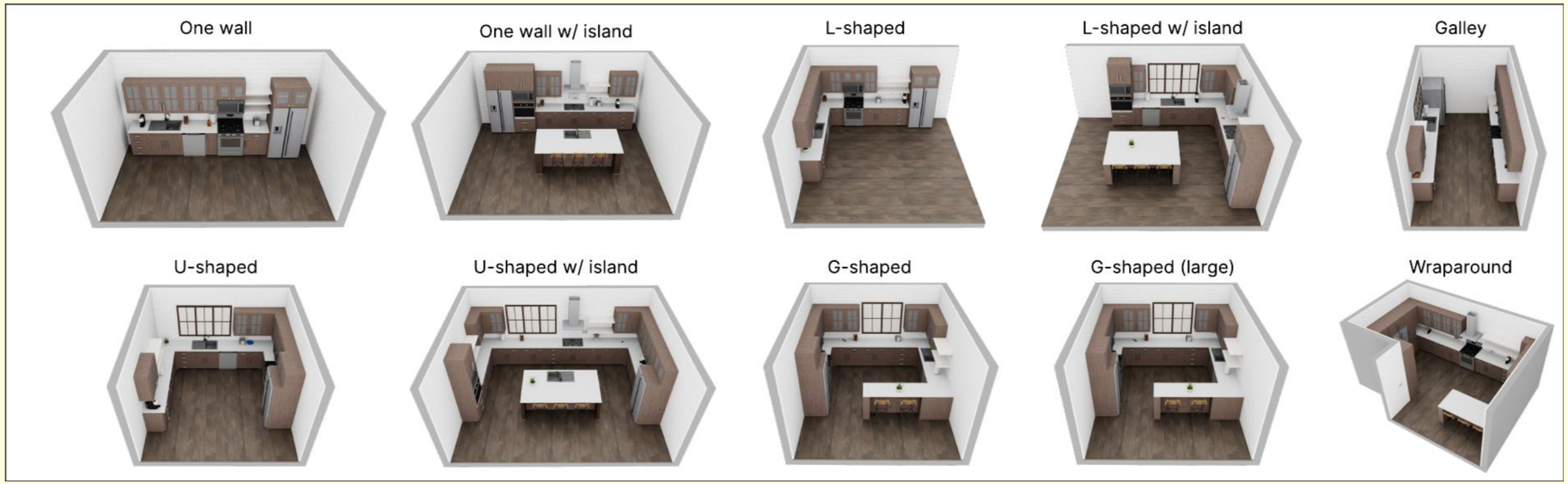
what if we use sim?

robocasa is..

- a (relatively) realistic simulation environment
- a large set of tasks as benchmark
- a giant dataset gathered from the environment

the simulator

- use RoboSuite (MuJoCo) as a base
- support _mobile manipulators_ (like humanoids and robot dogs)
- photorealistic rendering
- first focus on kitchens with a variety of styles

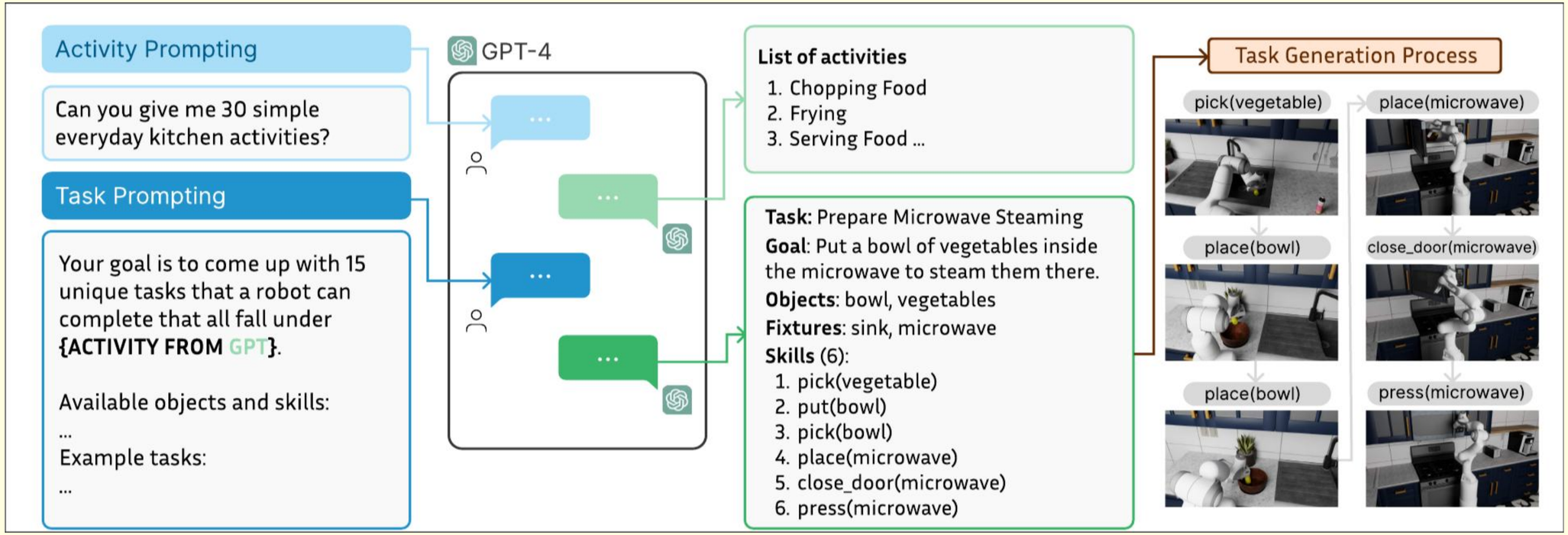


the simulator

- assets from online repositories (Objaverse)
- also generate assets using text-to-3D (Luma.ai)
- segment the models to allow interaction (open microwave door)

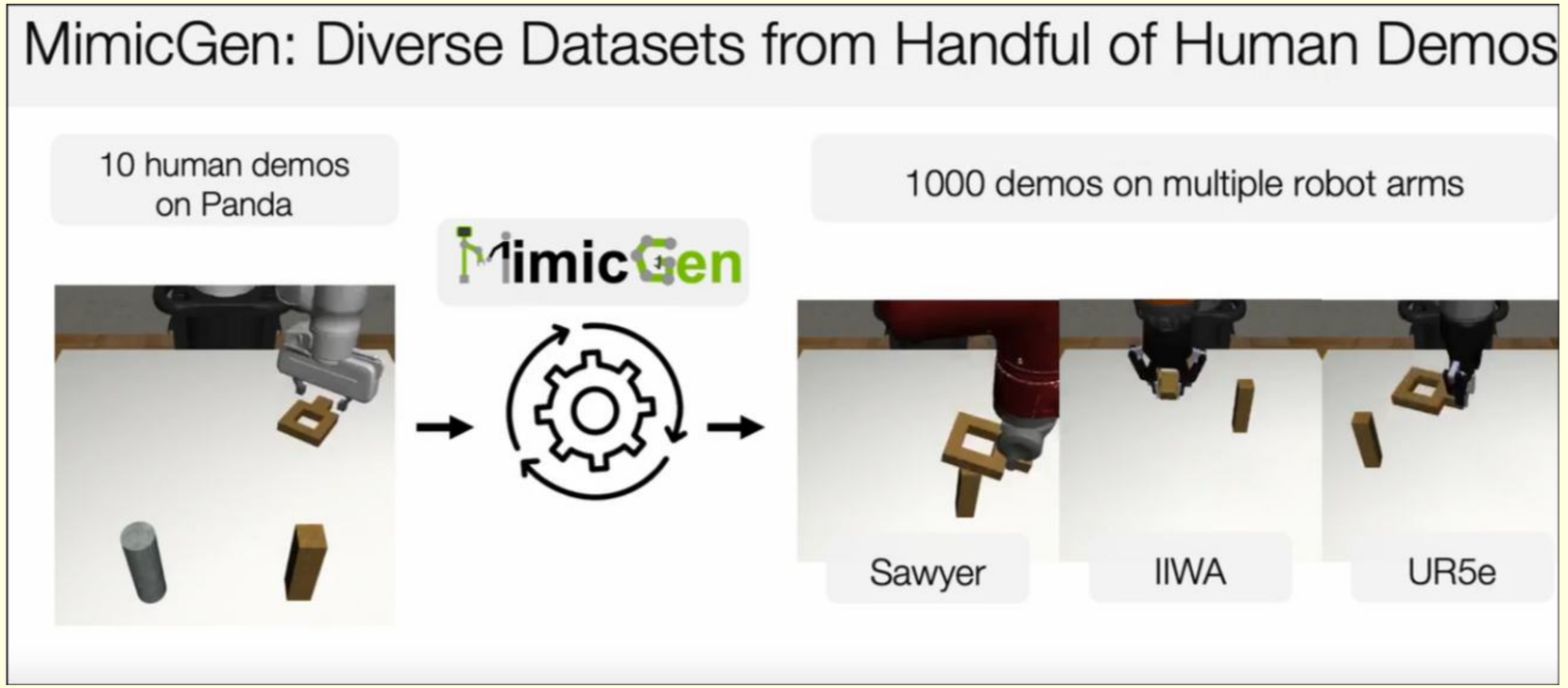
the tasks

- atomic tasks: basic skills like pick-and-place, opening drawer etc
- composite tasks: use LLM to chain together atomic tasks (sorta like saycan)



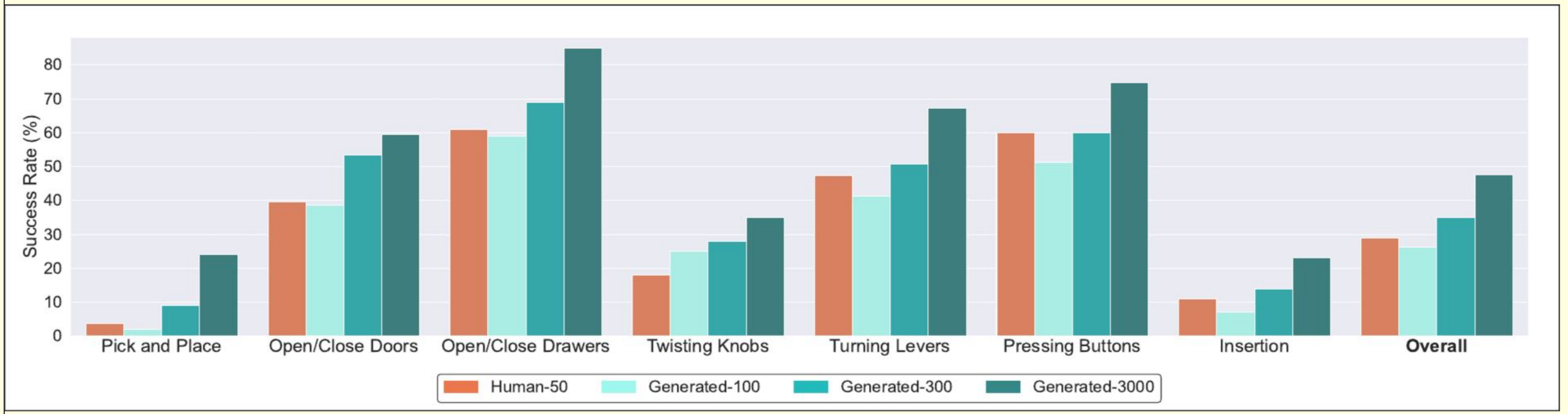
the dataset

- humans collect a bunch of trajectories using space mouse (not intuitive)
- use mimicgen to generate synthetic trajectories based off human ones



results

compare models trained off human data vs synthetic data
we do see scaling laws at play



human data has 28.8% success rate, synthetic has 47.6%

sim2real

Setting	Task	Real only	Real + Sim (Ours)
Seen Obj	Counter to sink	12.7 ± 2.5	**22.0 ± 2.8**
	Sink to counter	20.0 ± 5.9	**29.3 ± 4.1**
	Counter to cabinet	8.0 ± 1.6	**22.0 ± 5.8**
	Task average	13.6	**24.4**
Unseen Obj	Counter to sink	3.3 ± 4.7	**8.9 ± 7.9**
	Sink to counter	1.1 ± 1.6	**7.8 ± 4.2**
	Counter to cabinet	3.3 ± 4.7	**11.1 ± 11.0**
	Task average	2.6	**9.3**

2.6% success with human data
9.3% with synthetic

conclusion

sim is promising, but we are far from perfecting it