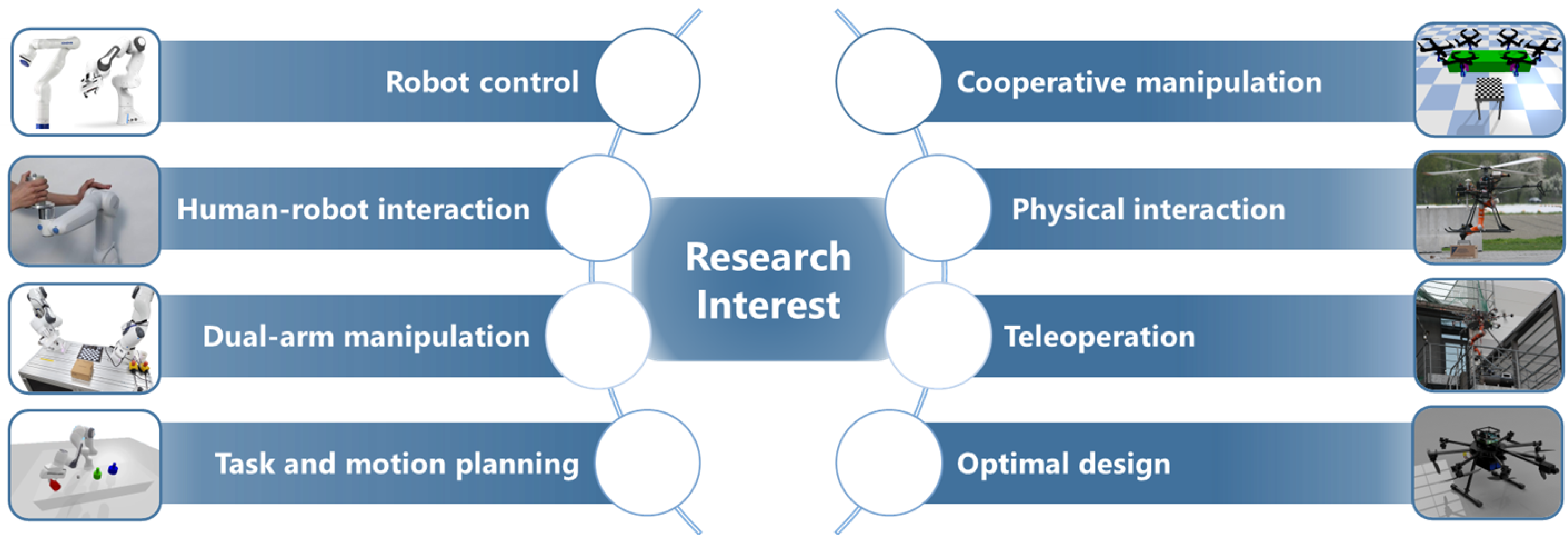
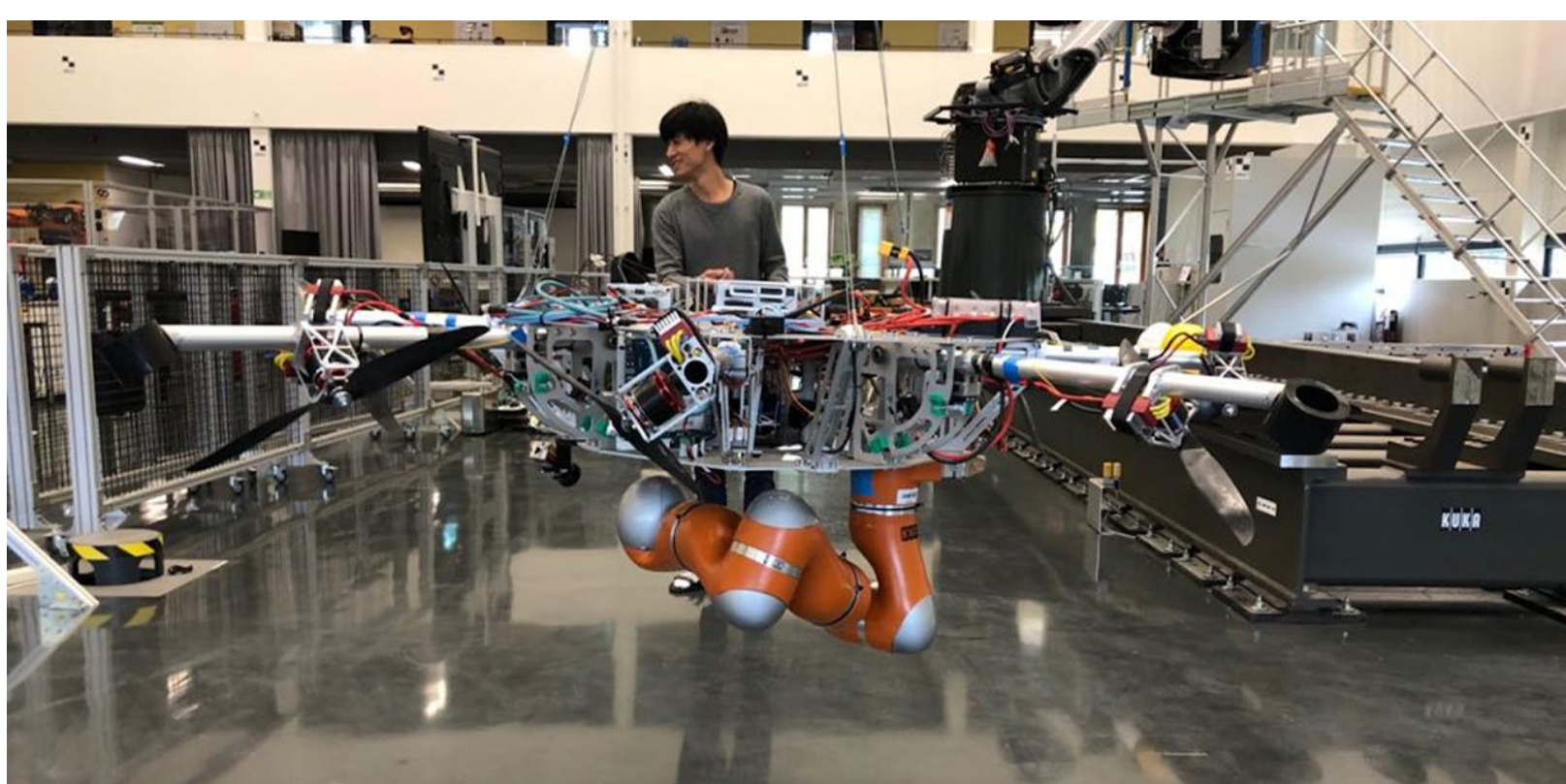


Advisor	Prof. Min Jun Kim
Division	Signal
Website	https://sites.google.com/view/kaist-roboticslab
Members	Ph.D candidate 8 / MS candidate 6
Research Interest	Robotics

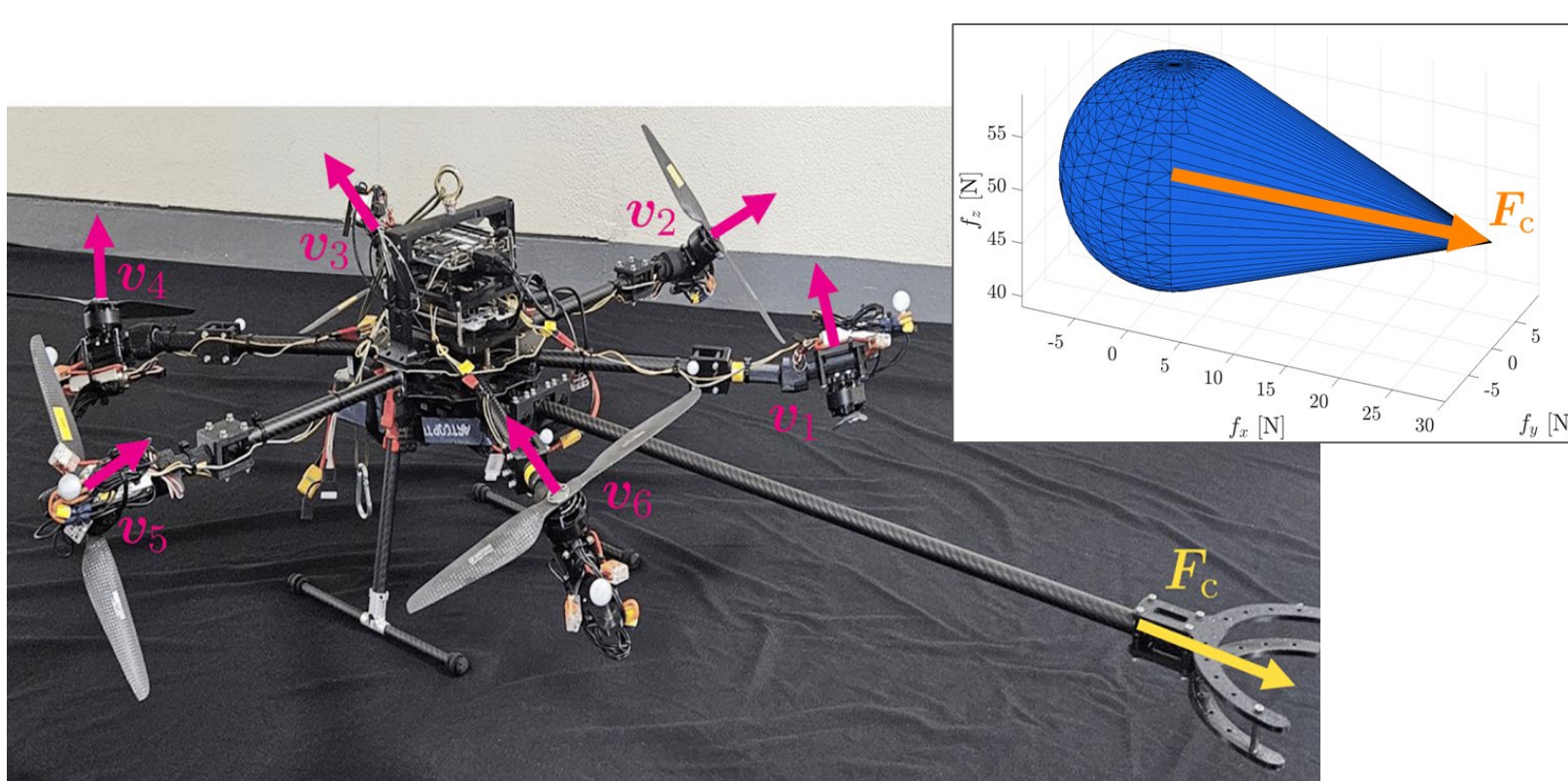


- We are interested in general robotic problems, particularly in **physical interaction problems with robot mobilities** (fixed, wheeled, aerial, semi-aerial, etc.)
- Combining physical interaction problems with mobility raises challenges, such as **design, modeling, control, state estimation, perception, cognition, and planning**
- We develop intelligent robots with practically appealing scenarios in mind

Robot Design

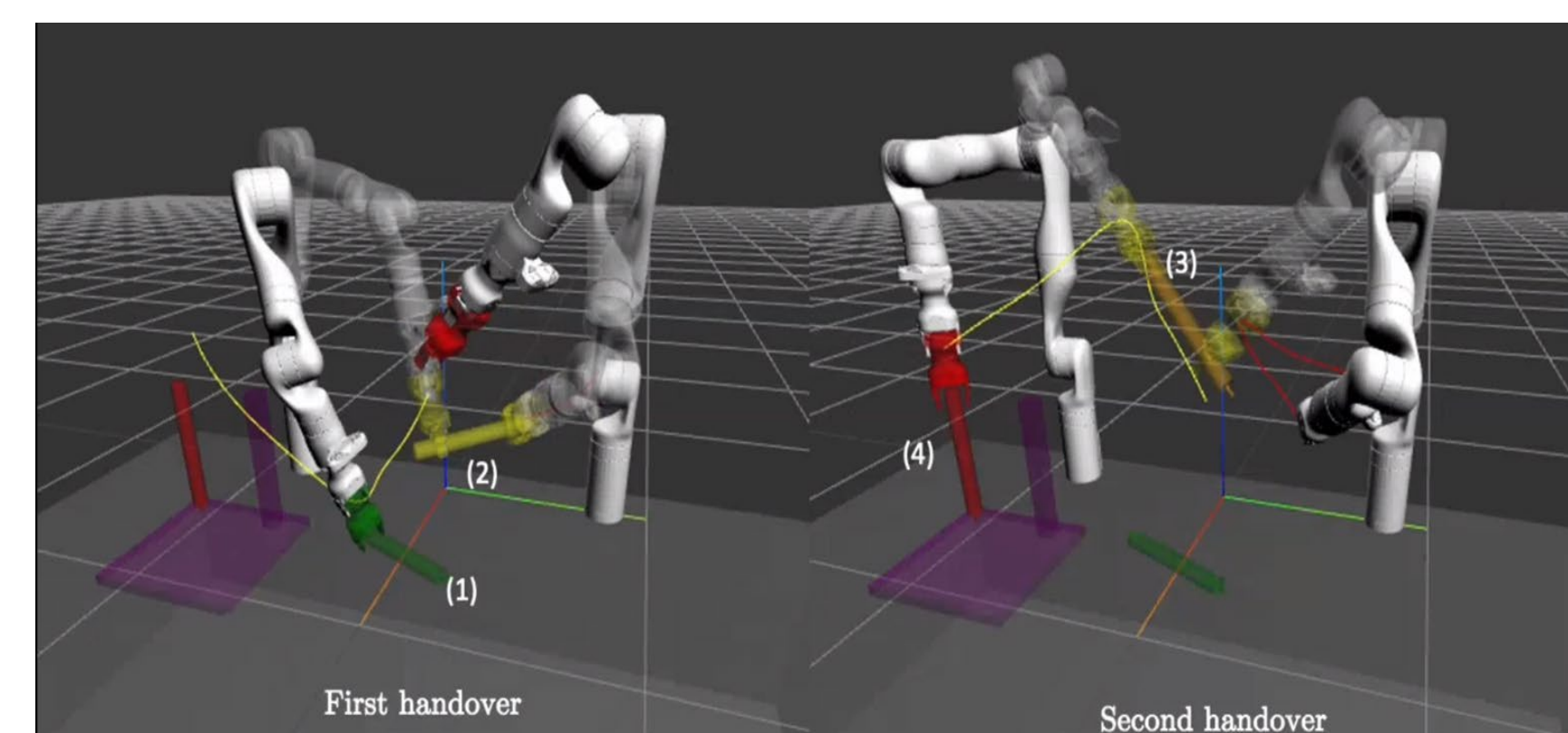


- Cable-suspended aerial manipulator
- Cable sustain gravitational load
- Higher load, longer operation time

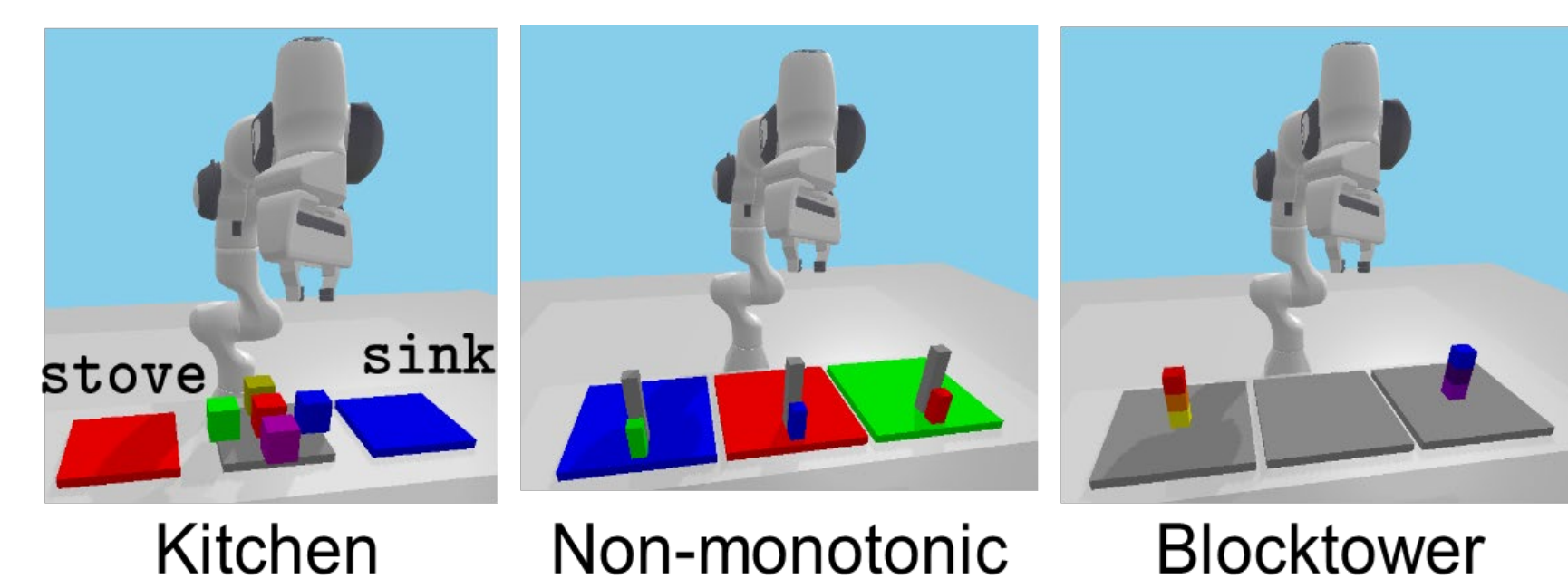


- Fully actuated drone with non-isotropic wrench shape
- Energy efficient, greater force in task direction

Planning



- Simultaneous grasp selection & motion planning through constrained optimization
- Long-horizon task addressing motion & grasp constraints

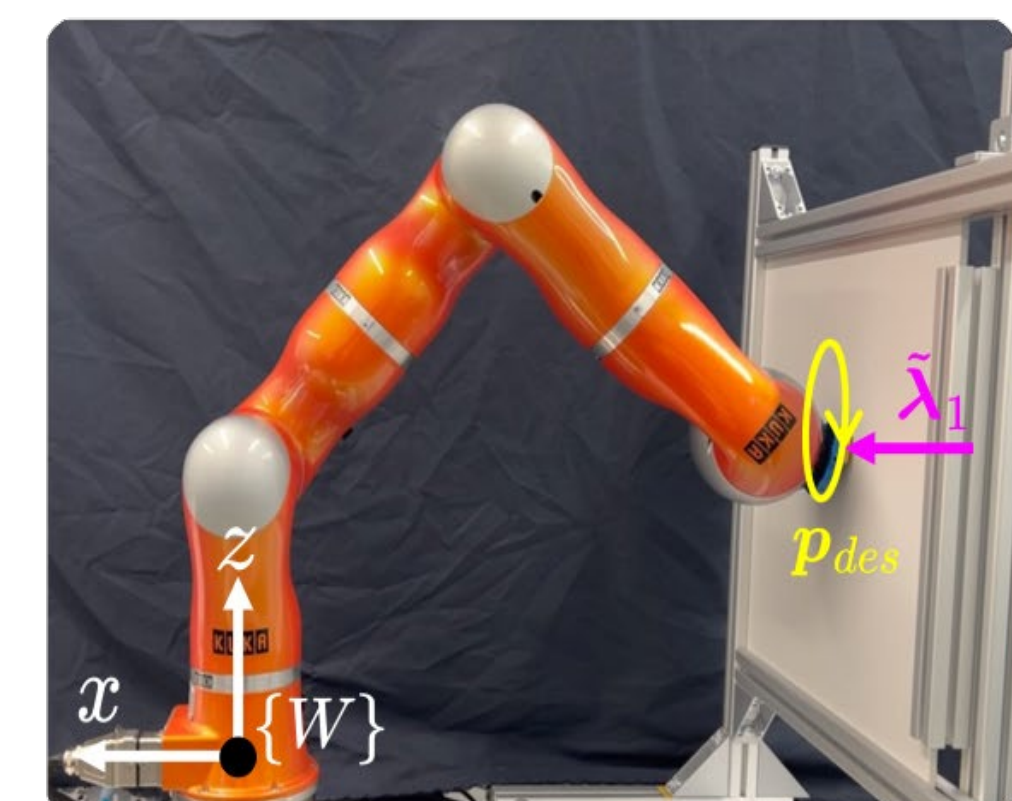


- Task & motion planning algorithm using Reachability Tree & Monte Carlo Tree Search
- Rewards generated from motion planning enhance task planning

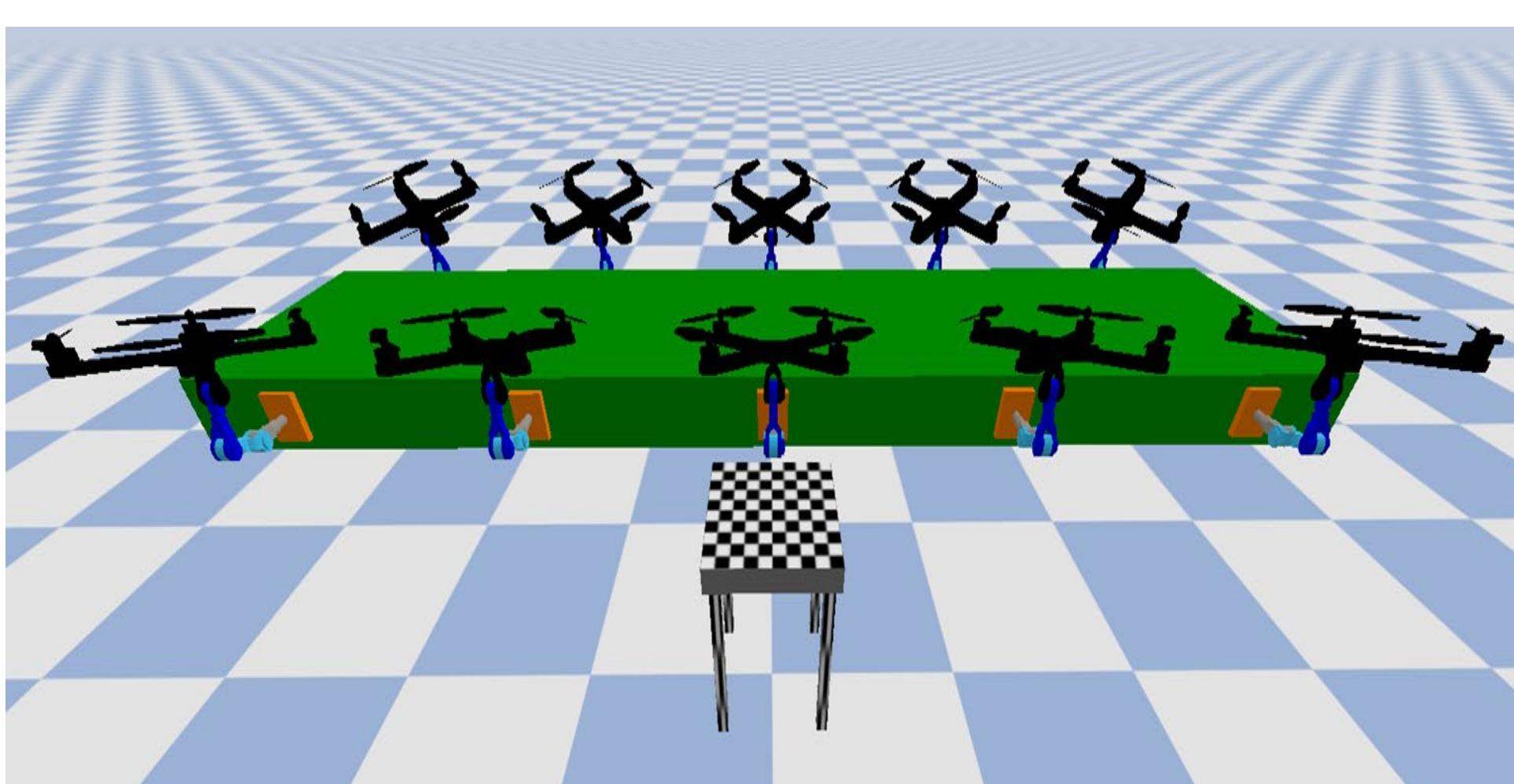
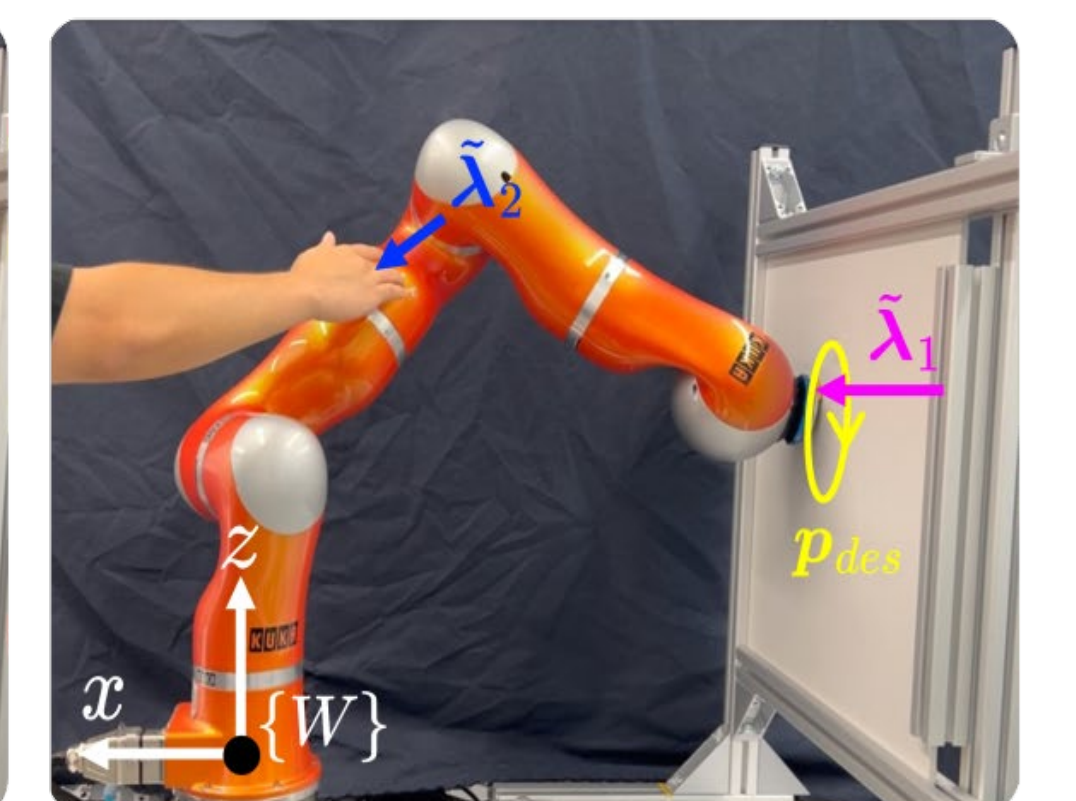
Robot Control



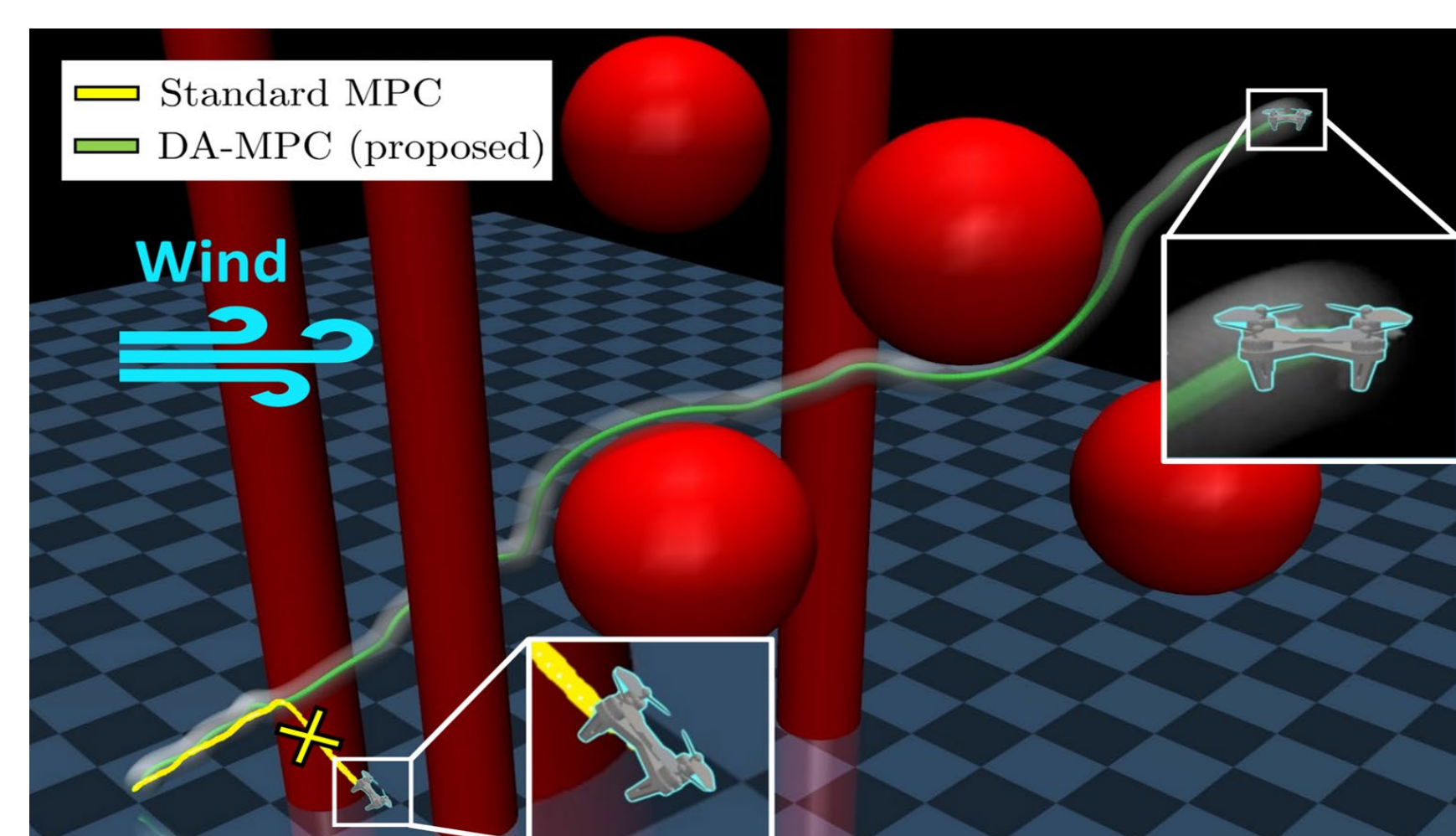
- Constrained nonlinear disturbance observer for robotic manipulator
- Enable contact-responsive motion (Left), Ordinary DOB results in excessive torque (Right)



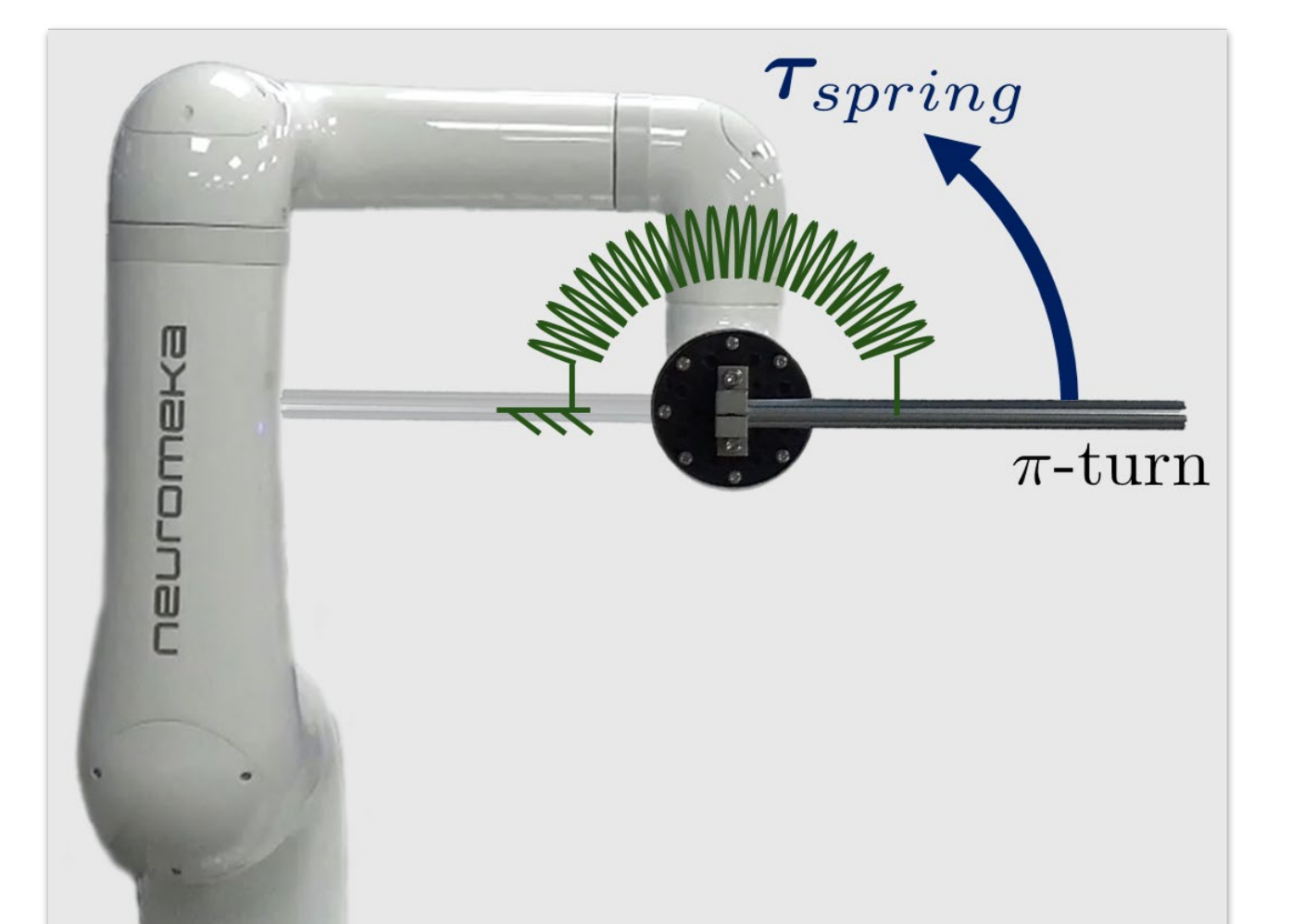
- Multi-contact feedback MPC for interactive tasks
- Particle filter-based contact estimation



- Collaborative grasping using multiple AM
- Passivity-based decentralized impedance controller



- Disturbance-aware MPC of underactuated robots
- Robustify MPC using disturbance observer



- Memory-based SO(3) representations
- Natural spring torque beyond π -turn