Unifying Rigid and Soft Grippers for Assistive Eating

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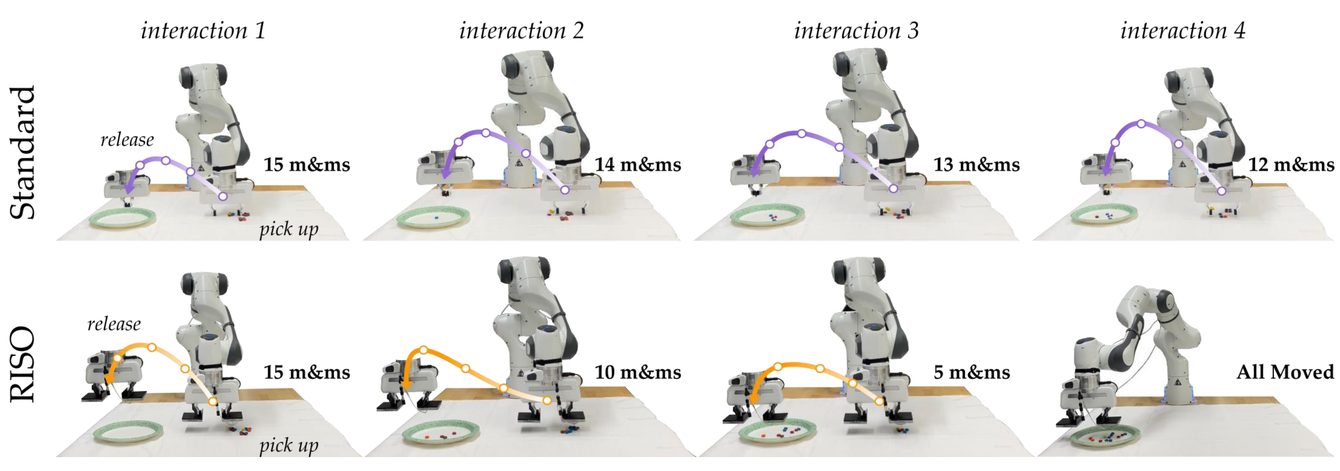
Motivation

Over one million American adults living with physical disabilities need help eating

Rigid grippers fail on small, slippery, irregular foods; soft grippers fail on large, heavy objects

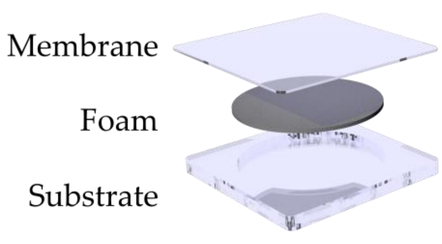
Scientific Contribution

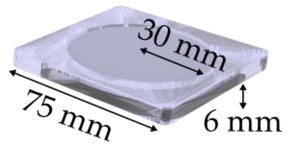
This award aims to develop new fundamental understanding of object manipulation by combining soft, tunable adhesives and rigid, parallel mechanisms

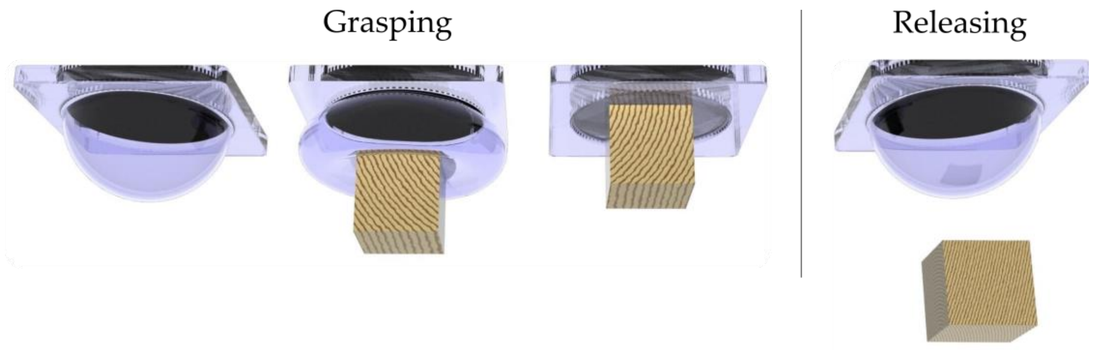


Objectives

1. Characterize how robots and humans use rigid, soft, and rigid-soft grippers
2. Learn from human inputs to autonomously pick up new items with rigid-soft grippers
3. Unify the continuous spectrum of rigid and soft grippers under a physics formalism

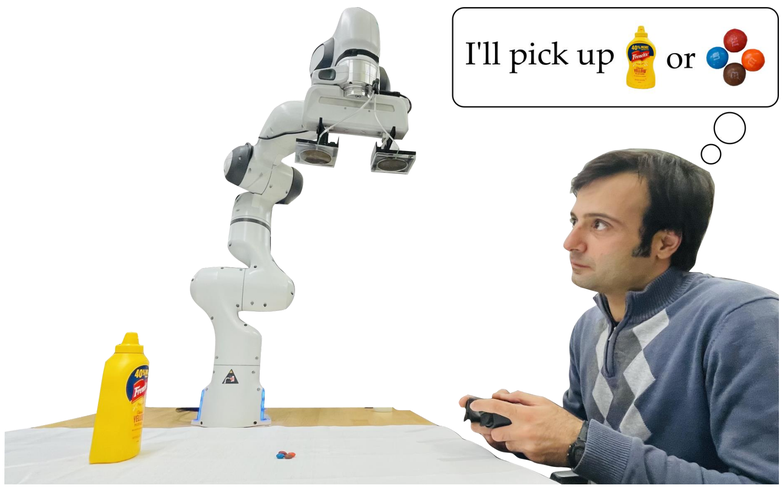


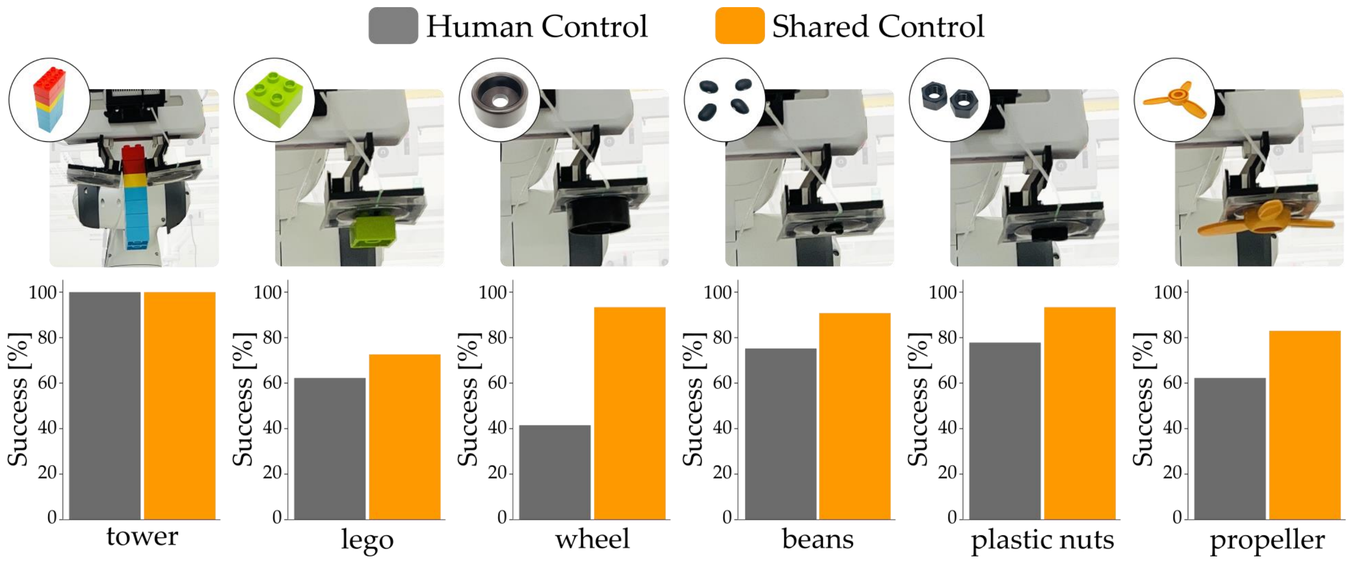




Recent Findings

- Made RIgid-SOft (RISO) grippers that coat traditional rigid grippers with novel soft adhesives
- Developed shared autonomy algorithms to partially automate control over RISO grippers
- Performed user study to compare RISO grippers with **Human Control** and **Shared Control**





Broader Impacts

- Applications in assistive eating, food processing, manufacturing, and fruit harvesting
- Hosting live and remote demonstrations where K-12 students control a robot arm + RISO

2023 FRR & NRI Principal Investigators' Meeting
May 2-3, 2023
Award ID#: 2205241
"RISO: Combining rigid grippers with soft switchable adhesives," RoboSoft 2023