ERI: Tool Grasping Compliance and Stability of Underactuated Hands in Model-Mediated Telemanipulation
Project Introduction and Year 1 Development

Long Wang, Stevens Institute of Technology

Contacting Information:
lwang4@stevens.edu

Motivation

Manufacturing Environment Hazards & Constraints

- Manufacturing environments present common safety and health risks to the workforce.
- Musculoskeletal disorder (MSDs) account for over 600,000 injuries/illnesses each year.
- COVID-19: the stay-at-home orders lead to many shutdowns of manufacturing industries.

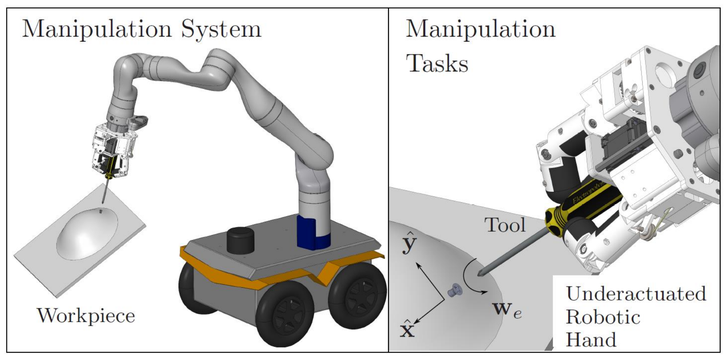
Empowering the Workforce

- Extend their physical reach, hands-on manipulation dexterity, and situational awareness intelligence, from local to remote sites.
- Target complex, ad-hoc, and on-demand manufacturing manipulation tasks (such as automotive assembly, airplane maintenance, or ship repairs).
- Utilize low-cost ***underactuated*** hands for handling ***tools*** in ***force-controlled*** tasks.

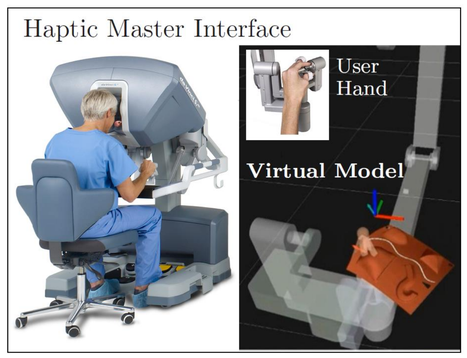
Proposed Solution

- A model-mediated telemanipulation framework for ad-hoc and on-demand manufacturing manipulation tasks.
- Enable the use of underactuated robotic hand for tool grasping in force-controlled tasks.

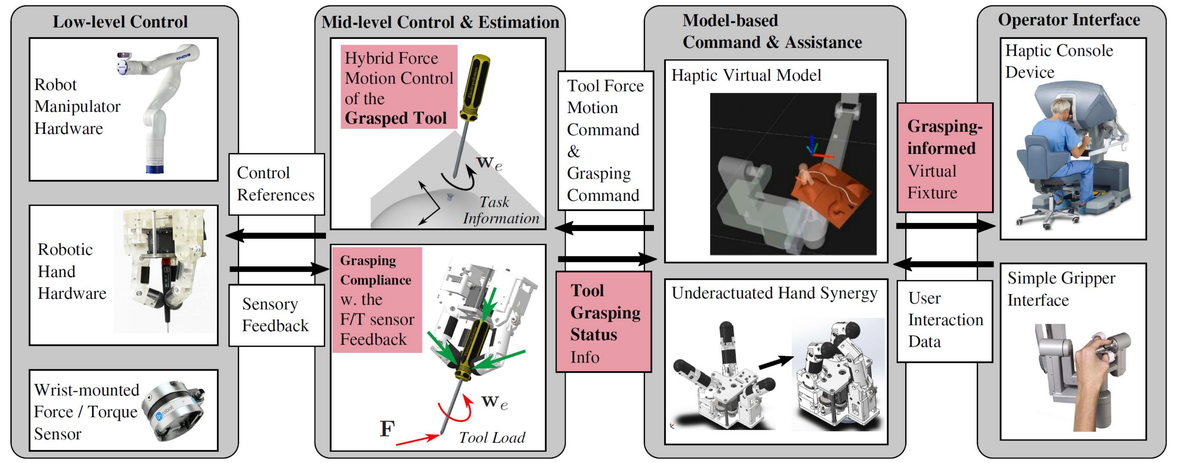
Remote Environment



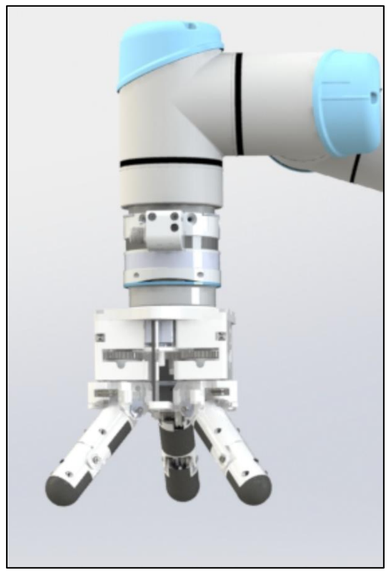
Operator Space

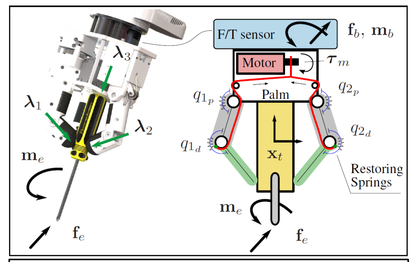


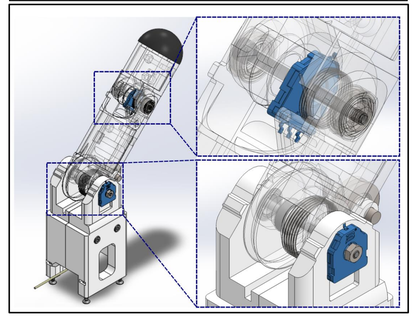
Proposed Framework and Technical Gaps

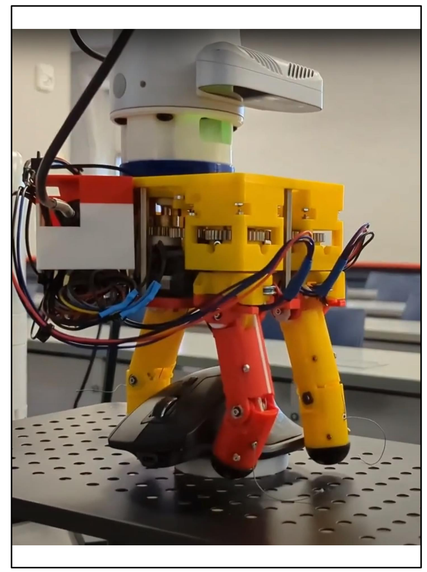


Hand Hardware Development & Grasping Compliance Investigation









2023 NRI & FRR Principal Investigators' Meeting
May 1-3, 2023

Award ID#: CMMI-2138896