NRI: FDN: Dexterous Manipulation using Multi-Serial Manipulator Systems with Real-time Compliance Modulation, Grant #: 2024554

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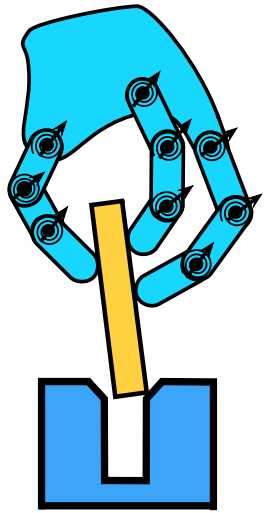
Challenge

- Achieve robot dexterity in ***any*** constrained manipulation task
- Need task-appropriate passive compliance that can be readily adjusted
- Single manipulator systems have very restricted set of achievable compliant behaviors

Solution

- Realize much larger set of passive compliant behaviors attained using multi-serial manipulator systems
- Variable stiffness actuation allows both position control and stiffness modulation



Scientific Impact

- Procedures to synthesize desired compliant behaviors by specifying joint locations and joint stiffnesses when each manipulator is:
  - rigidly coupled to part
  - making point contact with part
- Track a position/compliance trajectory for kinematic and actuator redundant systems
- Manipulation 8x faster w/ lower contact forces

Broader Impact

- Manipulation of:
  - large/heavy objects with multi-arm system
  - small/fragile objects with multi-finger system
- Senior assistance, manufacturing, agriculture