CAREER: Dynamic Modeling and Fabrication of Compliant Material Systems for On-Demand Specialist Robots

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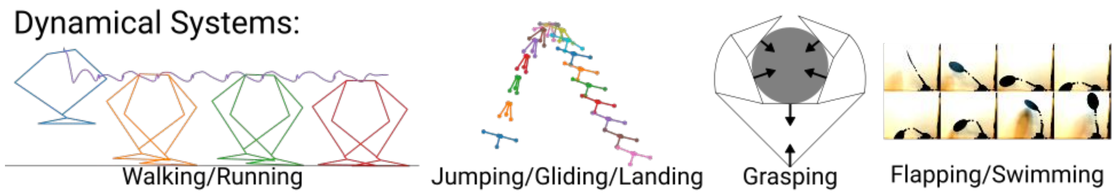
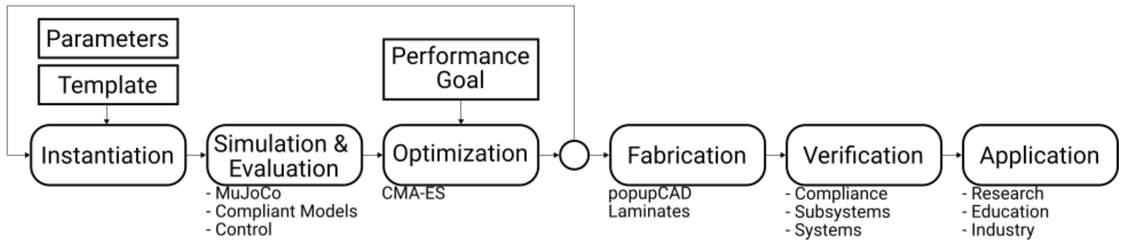
https://idealab.asu.edu/projects/career/ | https://www.nsf.gov/awardsearch/showAward?AWD_ID=1944789



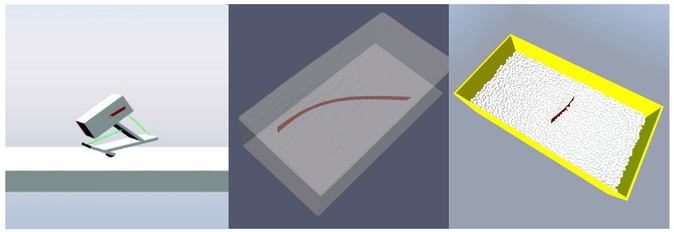


Problem Statement

- Lack of access to design and development pipeline for robotics
- Taking compliance and other nonideal behaviors into account during the design and optimization process.
- The time and cost limitations of physical prototyping are directed towards only a few variants of the physical platform.
- This results in limited use and applicability outside the field of robotics.

Approach

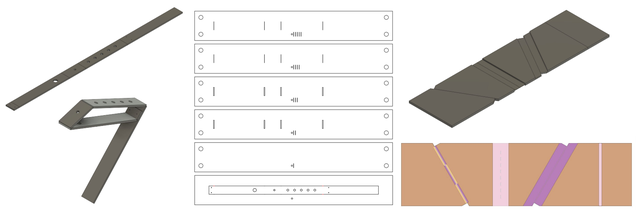
- Template based design
- Material aware design
- Optimization for niche environment
- Experimental validation



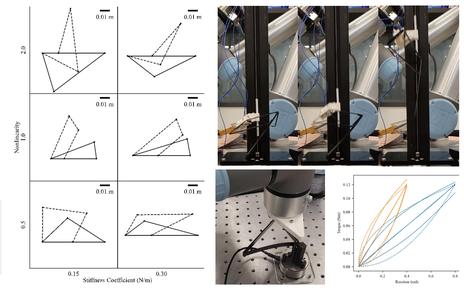
Multiphysics simulation of compliant materials interacting with different media

Research Objectives

- representation of compliance
- utilization and understanding of compliance
- optimization of compliant systems,
- validation through exemplar workflows and use cases



Accessible CAD tools for laminate device design



Compliance design for robotic jumping

Society Impact

- Assistive robots for the elderly
- Custom agricultural applications
- Trash pickup in smart cities
- Warehouse automation

Education and Outreach

- Integration into graduate and undergraduate curriculum
- STEM-focused robotics summer camp
- Collaboration with external evaluators to measure students' impressions of STEM

2022 NRI & FRR Principal Investigators' Meeting
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