"Robust Planning for Dynamic Tensegrity Structures"

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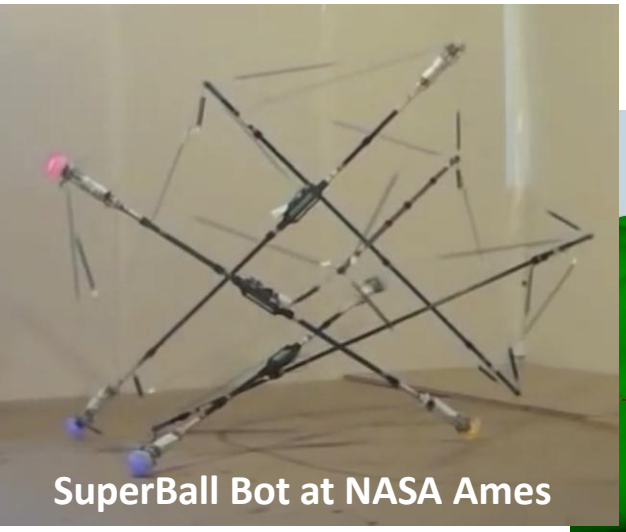
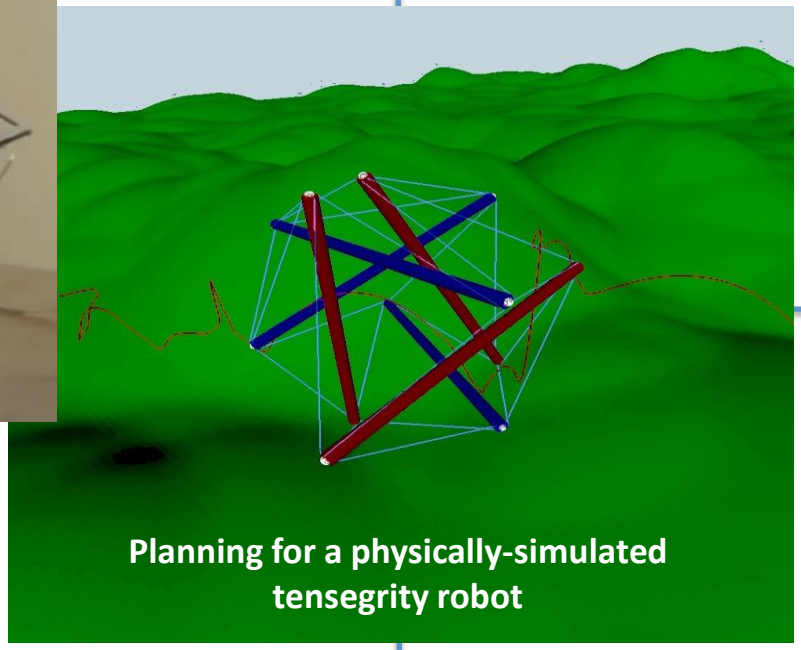


SuperBall Bot at NASA Ames



Planning for a physically-simulated tensegrity robot

Research Objectives

- Develop motion planners that take advantage of the dynamics of tensegrity structures
- Efficient belief-space planning under non-Gaussian noise and highly non-linear dynamics
- Provide guarantees in terms of path quality and robustness to noise and uncertainty

- The project will start as TRL 1-2 (foundations, algorithms) and complete at TRL 2-3 (frameworks, evaluation)

Approach

- Rigorous evaluation of methods for providing efficient gaits
- Efficient integration of local controllers with kinodynamic planners
- Provide robust trajectories that deal with uncertainty due to contact by efficient belief space planning
- Experiment on physically realistic models in simulation and on a real Super Ball Bot platform

Potential Impact

- Progress towards more capable, impact intolerant space probes with unique locomotion abilities
- Future missions can be cheaper due to lightweight and energy efficient nature of tensegrities
- Improve motion planning methods for high-dimensional, deformable robots with significant, non-linear dynamics
- Implications for use of tensegrity beyond space exploration