Asymmetric Gait Generation for Legged Locomotion in Complex Environments via Off-Line Model Reduction and Real-Time Optimal Control

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NSF award link: https://www.nsf.gov/awardsearch/showAward?AWD_ID=2128568&HistoricalAwards=false

Challenges

- Humanoids lack the ability to move in constrained environments
- Humanoid lack the ability to change their speed and directions quickly.
- Humanoids have high degrees of freedom which makes real-time control challenging

Proposed solution

- Closed-form, low dimensional quadratic polynomial models using data-driven approaches
- Formulating and solving quadratic programs for real-time control

Broader impact

- Humanoid robots for future applications
- Control methods useful for other systems with contact such as manipulators, legged systems, and prosthetics.

Contributions

- Creation of tools for building simple, yet accurate models for control.
- Creation of tools for fast online optimization
- Creation of tools for experimental evaluation and benchmark.

Broader impact (outreach and education)

- Research and training opportunities to minorities in STEM
- Spread awareness about STEM careers in Chicago area.