Agile and Dynamic Interactions for Mobile Manipulation


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Problem and Goal

We are developing robots that can safely and efficiently work alongside people in crowded and unstructured spaces. To perform tasks efficiently, robots will need to reason about and exploit dynamic interactions with the environment

Technical Approach

Human study on dynamic interactions

- Explore how humans exploit contacts
- Learn from human demonstrations

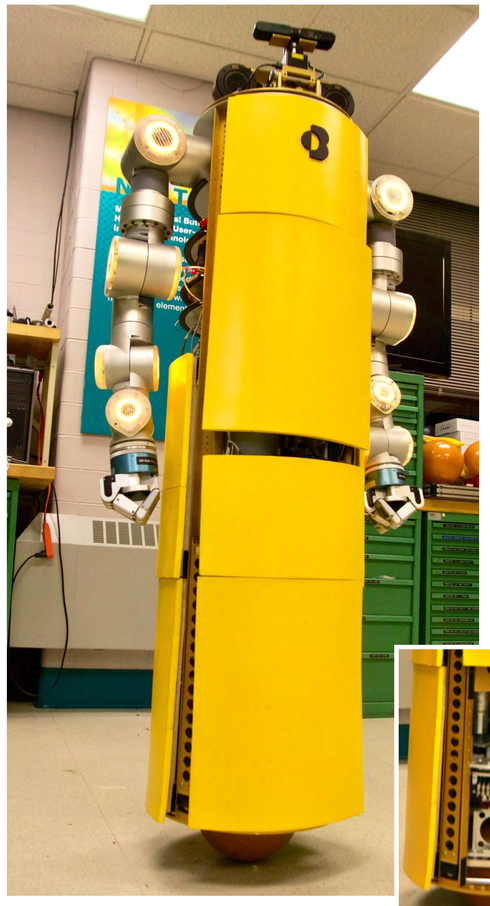
Acquiring dynamic skills and reflexes

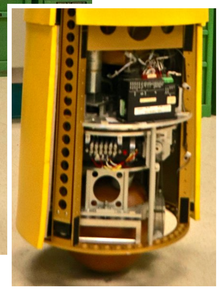
- Fast reflexes for quick interactions
- Skills for continuous contact tasks
- Switching model-based control

Develop soft end effectors for robot

- Soft hands for dynamic interactions
- Sensorized gloves for human study

Ballbot Platform

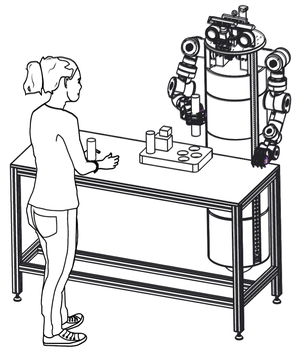


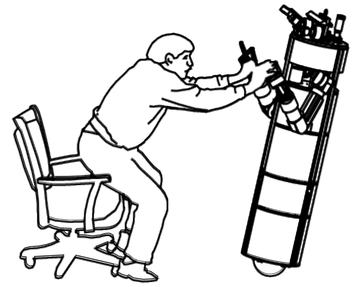


- Dynamically stable robot balances on a single spherical wheel
- Human-sized torso with small footprint for operating in human environments
- Omnidirectional compliance controller for safe physical interactions
- New 7 DoF arms with dexterous hands for advanced interaction control

Integrative Tasks

- Maneuvering a wheelchair
- Guiding people through buildings
- Cooperative carrying
- Cooperative task teaching
- Sit-to-stand maneuvers
- On-the-move grasping
- Dynamic navigation





Preliminary Results