

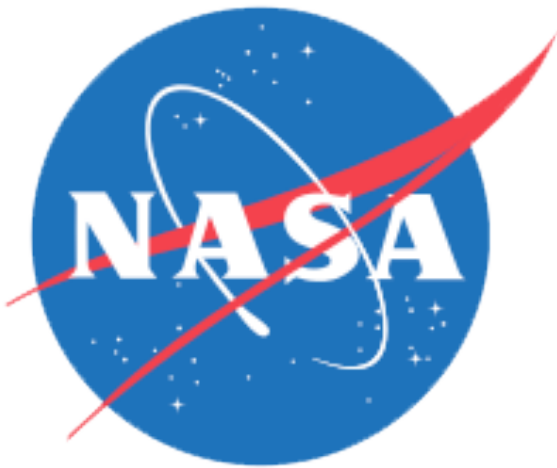
Cooperative Control of Humanoid Robots for Remote Operations in Nuclear Environments

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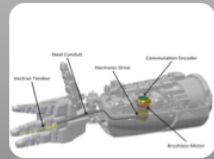
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Motivation



Cooperative Control



Novel Humanoid Platform

- High degrees of freedom
- Dexterous hands
- State of the art sensor suite



Intuitive Control

- Unified planning and control
- Human supervision
- Ambient intelligence



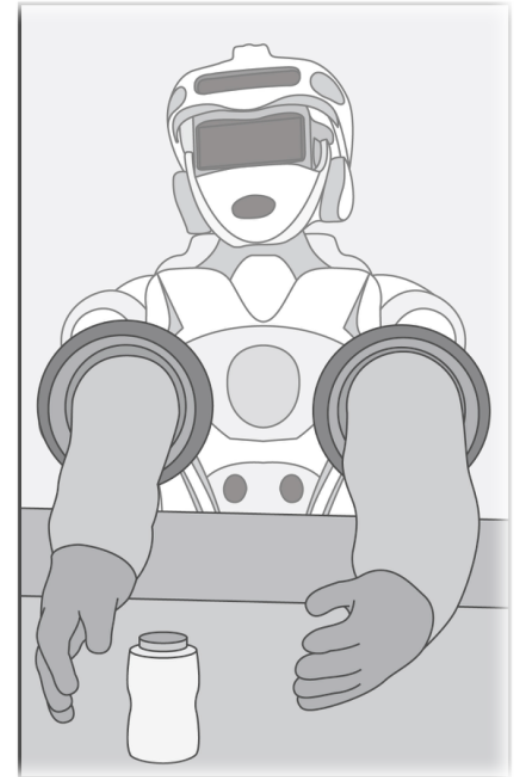
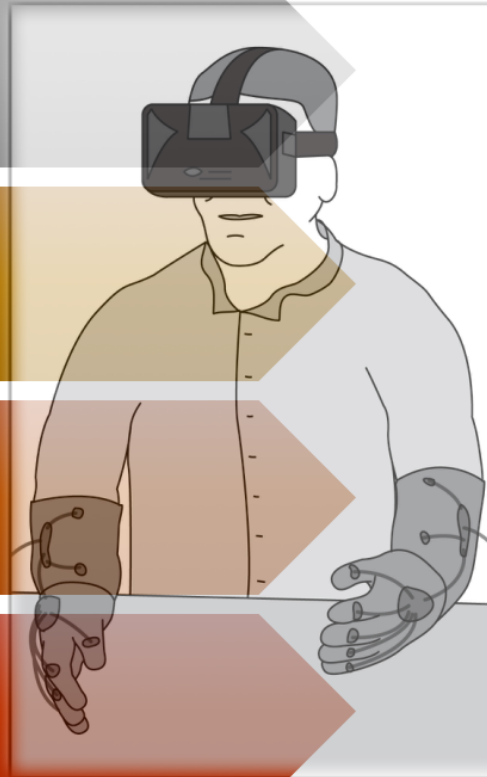
Human-Robot Interaction

- Remote and risk averse operations
- Multi-modal control interfaces
- Tightly-coupled decision making

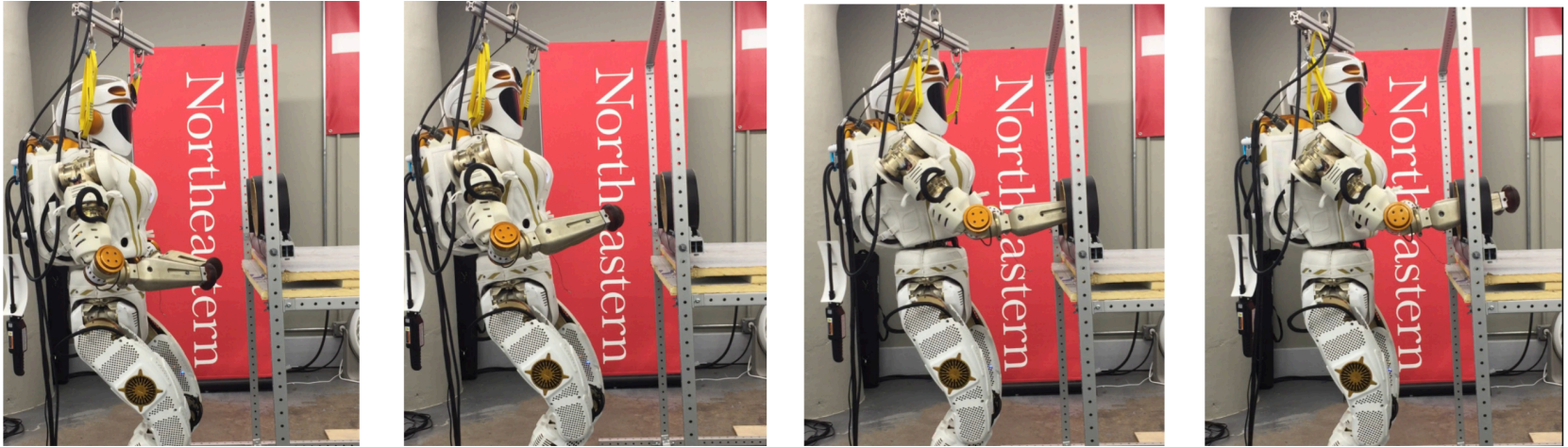


Task Validation

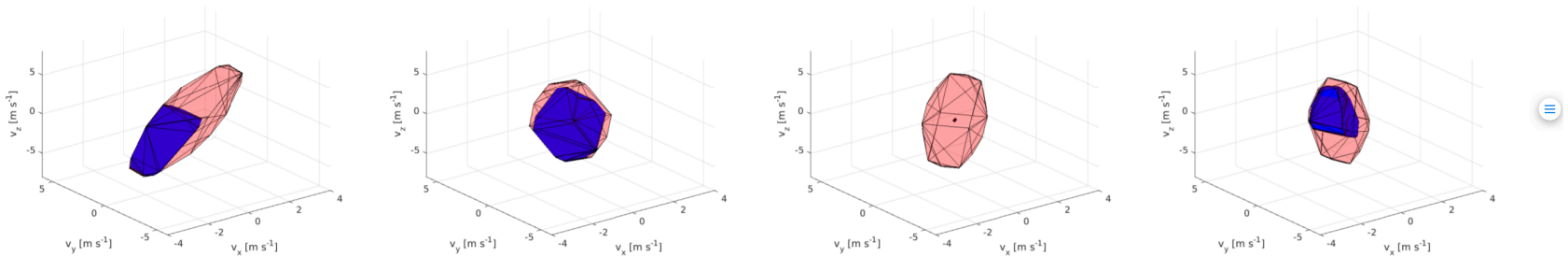
- Systematic factorization
- Model-based design
- Testbed development



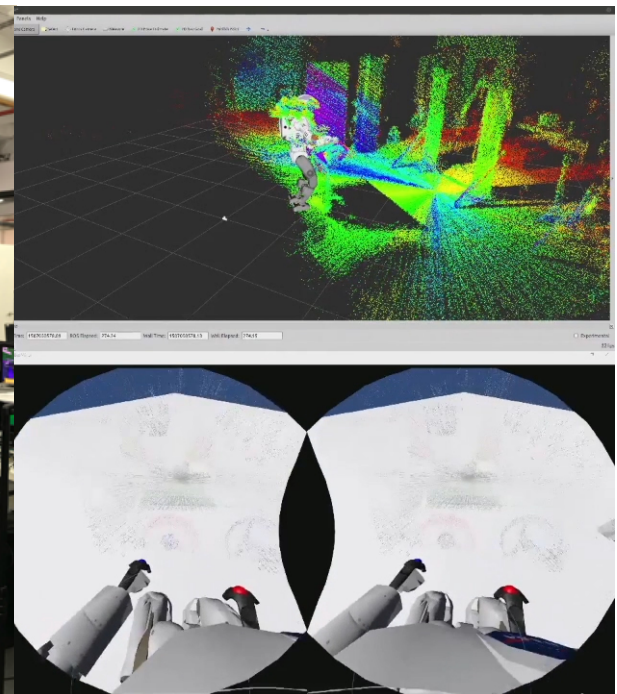
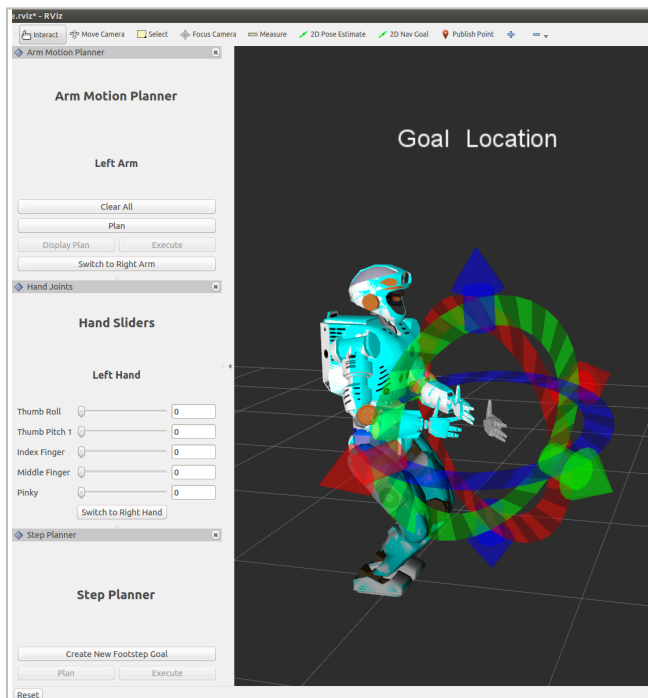
Risk-informed Constrained Task and Motion Planning



(a) Valkyrie inserting both arms into a glovebox shown at four timesteps.



Multi-modal Interface Design and HRI



Broader Impacts



Poster #97



Thank you!