List of contributions

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Contact Planning in Real environment

- Understanding the environment through a point-cloud Segmentation pipeline:

    - Acquisition
    - Filtering
    - Region growing segmentation
    - Planar Extraction
    - Planar projection and Hull convex generation
    - Re-orientation and transfer to the planner

- Contact generation with convex surface inclusions Usual methods for generating surface contact are based on point-to-point sampling, on rectangular inclusion, or other limiting methods. We proposed to extend that to the inclusion of convex surfaces.

- Simulated scenarios planned on real-environment We present 2 planned scenarios with the HRP-2 robot

Integration on Non-Inclusive Contacts in Posture Generation   The method presented before is still limiting in many cases. Ladder, stairs climbing. . . . Sometimes it is not possible to ensure inclusion of 2 surfaces.

- Contact geometry formulation

- Present the difficulties related to intersecting 2 convex polygons. Non-constant number of constraints.

- Non inclusive contact constraints

    - Main Idea
    - Pseudo-distance
    - Modification of the optimization problem
    - Maximixation of the contact area
    - Using non inclusuve contact to maintain stability

- – Extension to singular cases

- Simulation Results

    - – Inclined ladder climbing
    - – Vertical ladder climbing
    - – Climbing Stairs
    - – Walking along a path made of small objects

On the use of lifted variables for Robotics Posture Generation

- Introduction

- Lifting Algorithm

- Optimization on lifted variables

- Condensed BFGS update

- Results, experimentation

- conclusion