

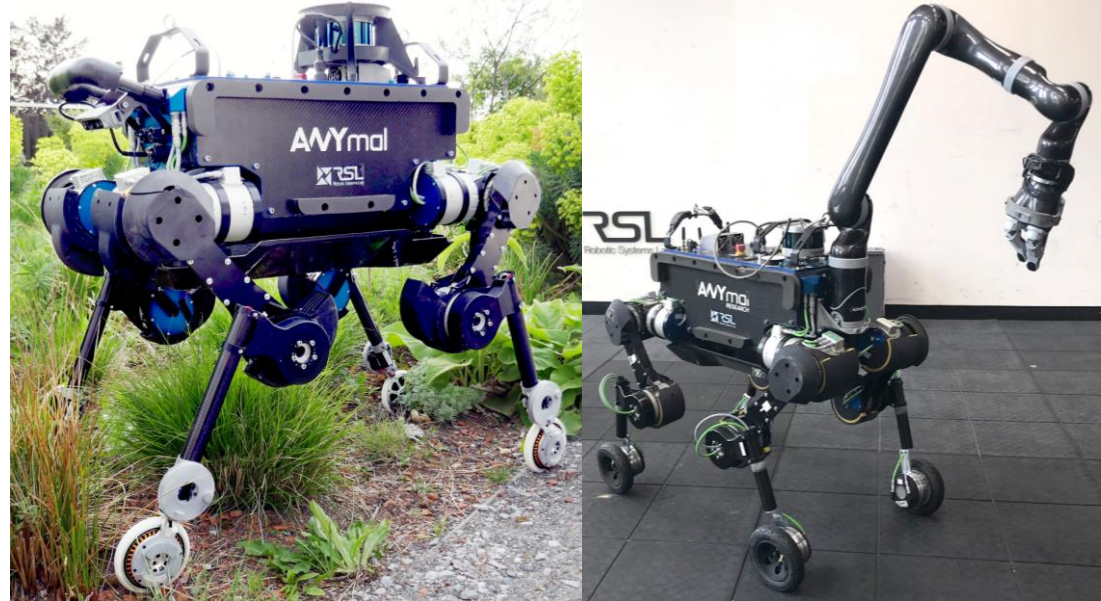
Keep Rollin' - Whole-Body Motion Control and Planning for Wheeled Quadrupedal Robots

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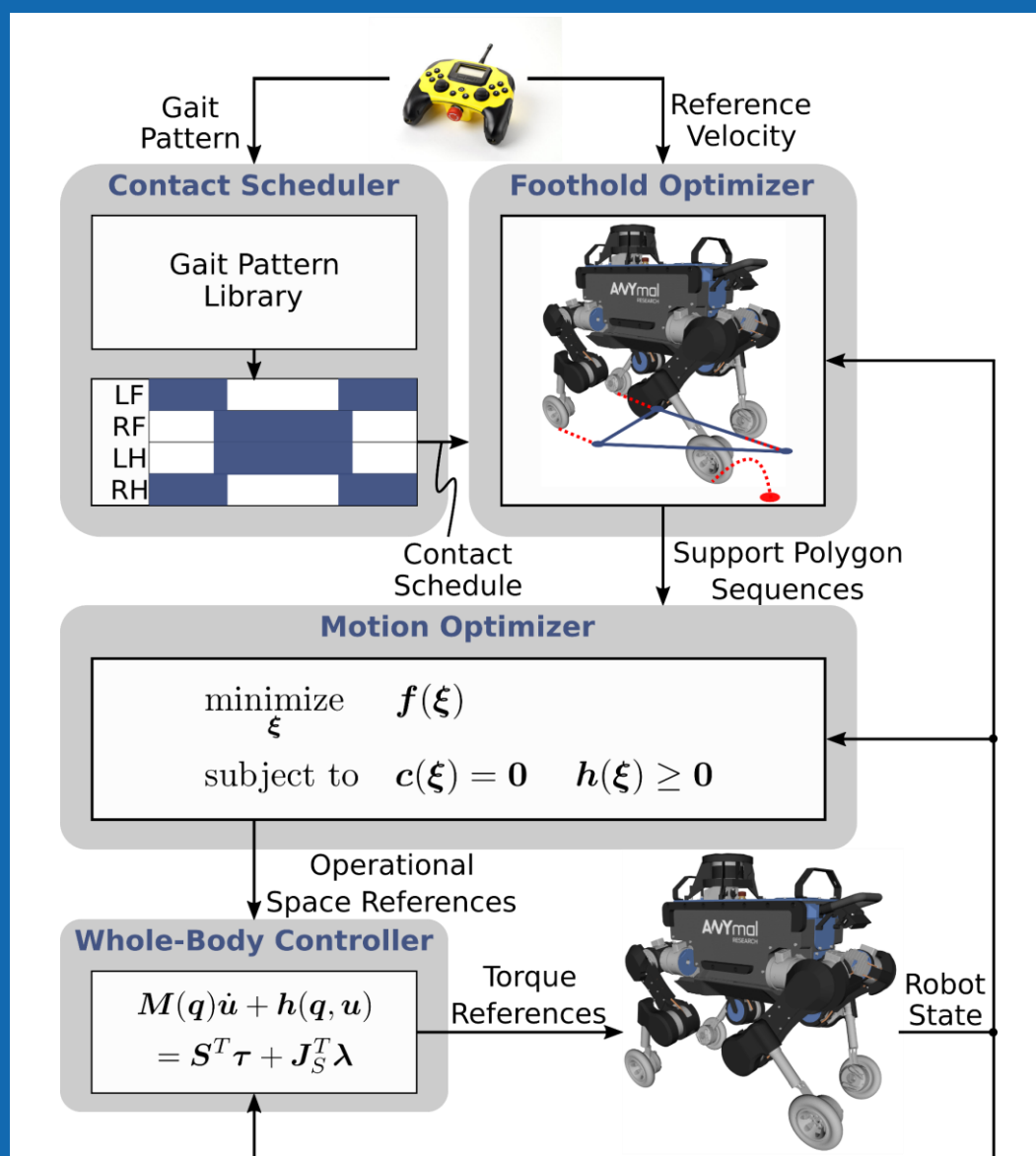


1 ANYmal on Wheels

- Tight integration of the additional degrees of freedom introduced by the **actuated wheels**
- Robot combining the **rough-terrain capability** of legs with the **efficiency** of wheels
- **Fast, efficient, and versatile** locomotion over long distances and in rough terrain
- **Zero-Moment Point** based motion optimization continuously updates reference trajectories
- **Hierarchical whole-body controller** includes the nonholonomic rolling constraints



2 Approach



3 Results

- **Dynamic and hybrid motions** on flat, inclined and rough terrains
- **Combines the advantages** of wheeled and legged robots
 - Speed of 4 m/s
 - Cost of transport is lower by 83 % w.r.t. walking

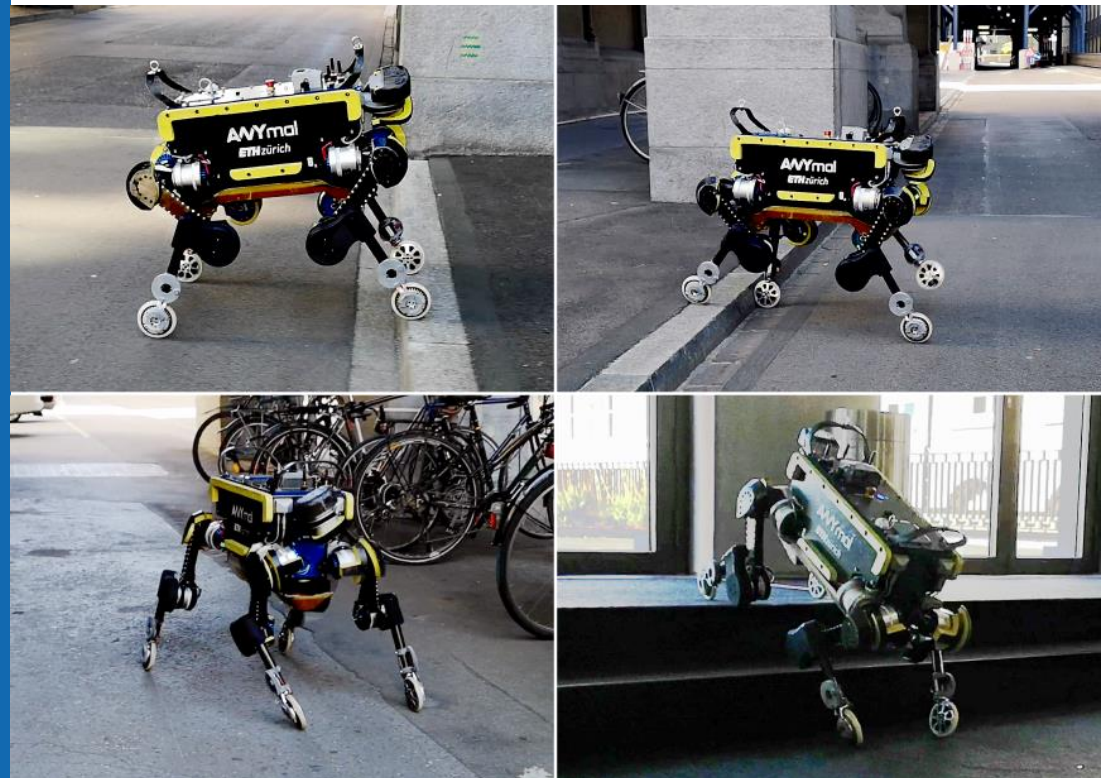


Fig. 1. The figure illustrates several skills of the wheeled version of ANYmal: dynamically driving down a step with 1 m/s (top left image), walking up a step (top right image), driving in a curve by yawing the base (lower left image), and dynamically driving down stairs with 1 m/s (lower right image).

