DEVELOPMENT OF WAIST PERTURBATION EFFECTOR FOR INVESTIGATING RELATIONSHIP BETWEEN MECHANICAL WORK AND METABOLIC COST

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INTRODUCTION

• Different groups studied the effects of constant force perturbations on metabolic cost.

Figure 1. Study from Kram et al. [1] with constant perturbations.

Aim

• Develop robotic setup that allows to test the effect of timing.

METHODS

Figure 2. Experimental setup with the Humotech actuator unit.

Figure 3. Control algorithm.

1) Heel strike detection based on GRF
2) Actuator pulls at desired stride percentage
3) Actuator magnitude adjusted based on previous strides

POTENTIAL APPLICATIONS

• Optimizing linear assistance devices (e.g. motorized walker or running jetpack) [2, 4].
• Investigating the relationship between changes in biomechanical parameters and metabolic cost.
• Balance perturbation, gait retraining [3,5].

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