



ISTITUTO ITALIANO  
DI TECNOLOGIA

#### TITLE

A Nonlinear Series Elastic Actuator for Highly Dynamic Motions

#### INVENTORS

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#### DESCRIPTION

A novel revoluted actuator transmission designed for force control applications. The actuator uses a hypocycloid mechanism to stretch a linear spring in a nonlinear way; it has extremely low mechanical impedance, low friction, excellent mechanical efficiency, and high energy storage capabilities relative to its size. The accurate, compact torque control actuation systems and the power-to-weight ratio make this actuator unmatched on the market.



#### APPLICATIONS

This actuator is optimized to be highly effective for mobile robots with legged locomotion. However, the invention is not limited to legged locomotion tasks but can find application in torque control, grasping/manipulation, mobile robotics, high-speed dynamic robots, safe human-robot interaction tasks, and soft-contact industrial manufacturing tasks currently performed by humans.

#### KEYWORDS

series-elastic, compliant actuation, nonlinear stiffness, hypocycloid, antagonistic variable stiffness, elastic transmission

#### BIBLIOGRAPHIC DATA TO2011A000848

Attuatore rotante elastico

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