Hip joint energy storage

Passive exoskeletons have potential advantages in reducing metabolic energy cost. We consider a passive elastic exoskeleton (peEXO) providing hip flexion moment to assist hip flexors during walking, our goal is to use a biomechanical model to explore the biological mechanics and energetics of the hip joint muscle-tendon-exotendon system for obtaining the ...

Lower limb energy storage assisted exoskeletons realize walking assistance by using the energy stored by elastic elements during walking. Such exoskeletons are characterized by a small volume, light weight and low price. ... and a stiffness optimization modulation method is proposed to store most of the negative work done by the human hip joint ...

The hip energy storage device includes two springs, one located anterior to the hip joint and the other posterior to the joint. The spring at the front of the hip extends from the sliding fixed device located inside the front slide of the triangular bracket to the upper anterior surface of the support strip of the modified knee-ankle-foot ...

A novel passive hip exoskeleton has been designed and built with the aim of reducing metabolic consumption during walking by a passive way of storing the negative mechanical energy in the deceleration phase and releasing it in the acceleration phase.

Lower limb energy storage assisted exoskeletons realize walking assistance by using the energy stored by elastic elements during walking. ... saving metabolic energy can be twice as high as that of ankle exoskeletons possibly because muscle-tendon unit in the hip joint is less energy-efficient than in the ankle joint. Expand. 122.

A hip joint which can "extend" beyond the vertical, coronal plane of the spine; The "Q" angle of the femoral neck (which helps to minimize rotational displacement) ... There is maximal potential kinetic energy storage within; b) the ankle joint (especially the posterior talo-fibular and deltoid ligaments) c) the lateral foot (especially ...

Simulations are conducted and the results show that the average absolute driving torque was reduced by 79.0% at the hip joint and 66.4% at the knee joint, with the use of this exoskeleton. ... An exoskeleton using controlled energy storage and release to aid ankle propulsion. Proceedings of the IEEE International Conference Rehabilitation ...

Article "Design and analysis of a passive exoskeleton with its hip joint energy-storage" Detailed information of the J-GLOBAL is an information service managed by the Japan Science and Technology Agency (hereinafter referred to as "JST"). It provides free access to secondary information on researchers, articles, patents, etc., in science and technology, medicine and ...

During walking, the peak hip joint torque and knee joint torque decreased in the energy storage phase and energy releasing phase, respectively (p < 0.01, p = 0.02), which showed the same trend with the reduction in semitendinosus and rectus femoris activities. Although the exoskeleton did not provide direct assistance to the ankle joint, the ...

variable stiffness energy storage assisted hip exoskeleton is designed, and a stiffness optimization modulation method is proposed to store most of the negative work done by the human

More akin to the ankle, the dynamics of the hip joint do potentially allow for passive energy storage and return during walking. One measure that is often analyzed in this context is the quasi-stiffness of a joint, or the slope of the moment-angle relationship during a dynamic movement (Rouse et al., 2013).

To address the limitation, we designed the hip energy storage walking orthosis (HESWO) which uses a spring assembly on the pelvic shell to store energy from the movements of the healthy upper limbs and flexion-extension of the lumbar spine and hip and returns this energy to lift the pelvis and lower limb to assist with the swing and stance ...

The hip energy storage device includes two springs, one located anterior to the hip joint and the other posterior to the joint. The spring at the front of the hip extends from the sliding fixed device located inside the front slide of the triangular bracket to the upper anterior surface of the support strip of the modified knee-ankle-foot ...

Background: The high energy cost of paraplegic walking using a reciprocating gait orthosis (RGO) is attributed to limited hip motion and excessive upper limb loading for support. To address the limitation, we designed the hip energy storage walking orthosis (HESWO) which uses a spring assembly on the pelvic shell to store energy from the movements of the healthy upper limbs ...

Of the exoskeletons that have assisted hip flexion, either independently or with another joint movement, most implemented one of only two assistive torque profiles: (i) an assistive torque profile ...

The energy-storage is the process of hip joint extension. The walking assistance is the process of hip joint flexion. (c and d): The assistive torque provided solely by the GBM, with preset pretension forces of spring being 105 and 135 N, respectively. (e and f): The assistive torque provided by the combined action of ESM and GBM.

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