

Biomechanics And Neural Control Of Posture And Movement

Neural control of limb stiffness

modulation of stiffness therefore, has applications in the areas of motor control and other areas pertaining to the neural control of movement. Studies

As humans move through their environment, they must change the stiffness of their joints in order to effectively interact with their surroundings. Stiffness is the degree to which an object resists deformation when subjected to a known force. This idea is also referred to as impedance, however, sometimes the idea of deformation under a given load is discussed under the term "compliance" which is the opposite of stiffness (defined as the amount an object deforms under a certain known load).

In order to effectively interact with their environment, humans must adjust the stiffness of their limbs. This is accomplished via the co-contraction of antagonistic muscle groups.

Humans use neural control along with the mechanical constraints of the body to adjust this stiffness as the body performs various...

Proportional myoelectric control

using them for lower-limb devices to better understand human biomechanics and neural control of locomotion. By using an exoskeleton with a proportional myoelectric

Proportional myoelectric control can be used to (among other purposes) activate robotic lower limb exoskeletons. A proportional myoelectric control system utilizes a microcontroller or computer that inputs electromyography (EMG) signals from sensors on the leg muscle(s) and then activates the corresponding joint actuator(s) proportionally to the EMG signal.

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for the Engineering Foundation Conference in Biomechanics and Neural Control of Movement. He was a member of the NIH-NICHD Subcommittee on Medical Rehabilitation

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Motor control

coordination, biomechanics, and cognition, and the computational challenges are often discussed under the term sensorimotor control. Successful motor control is

Motor control is the regulation of movements in organisms that possess a nervous system. Motor control includes conscious voluntary movements, subconscious muscle memory and involuntary reflexes, as well as instinctual taxes.

To control movement, the nervous system must integrate multimodal sensory information (both from the external world as well as proprioception) and elicit the necessary signals to recruit muscles to carry out a goal. This pathway spans many disciplines, including multisensory integration, signal processing, coordination, biomechanics, and cognition, and the computational challenges are often discussed under the term sensorimotor control. Successful motor control is crucial to interacting with the world to carry out goals as well as for posture, balance, and stability.

Some...

Degrees of freedom problem

"Functional tuning of the nervous system with control of movement or maintenance of a steady posture: I. Mechanographic analysis of the work of the joint or

In neuroscience and motor control, the degrees of freedom problem or motor equivalence problem states that there are multiple ways for humans or animals to perform a movement in order to achieve the same goal. In other words, under normal circumstances, no simple one-to-one correspondence exists between a motor problem (or task) and a

Biomechanics And Neural Control Of Posture And Movement

motor solution to the problem. The motor equivalence problem was first formulated by the Russian neurophysiologist Nikolai Bernstein: "It is clear that the basic difficulties for co-ordination consist precisely in the extreme abundance of degrees of freedom, with which the [nervous] centre is not at first in a position to deal."

Although the question of how the nervous system selects which particular degrees of freedom (DOFs) to use in a movement may be a problem...

Gait (human)

"Role of the cerebellum in the control and adaptation of gait in health and disease";. Brain Mechanisms for the Integration of Posture and Movement. Progress

A gait is a manner of limb movements made during locomotion. Human gaits are the various ways in which humans can move, either naturally or as a result of specialized training. Human gait is defined as bipedal forward propulsion of the center of gravity of the human body, in which there are sinuous movements of different segments of the body with little energy spent. Various gaits are characterized by differences in limb movement patterns, overall velocity, forces, kinetic and potential energy cycles, and changes in contact with the ground.

Lizeth Sloot

"The validity and reliability of modelled neural and tissue properties of the ankle muscles in children with cerebral palsy";. Gait & Posture. 42 (1): 7-15

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Motor coordination

Motor control, Internal model, and sensory-motor coupling Nikolai Bernstein proposed the existence of muscle synergies as a neural strategy of simplifying

Biomechanics And Neural Control Of Posture And Movement

In physiology, motor coordination is the orchestrated movement of multiple body parts as required to accomplish intended actions, like walking. This coordination is achieved by adjusting kinematic and kinetic parameters associated with each body part involved in the intended movement. The modifications of these parameters typically relies on sensory feedback from one or more sensory modalities (see multisensory integration), such as proprioception and vision.

Arm swing in human locomotion

*and differential diagnosis, and for tracking Parkinson's disease progression.[unreliable medical source?]
Biomechanics of sprint running Bipedalism Central*

Arm swing in human bipedal walking is a natural motion wherein each arm swings with the motion of the opposing leg. Swinging arms in an opposing direction with respect to the lower limb reduces the angular momentum of the body, balancing the rotational motion produced during walking. Although such pendulum-like motion of arms is not essential for walking, recent studies point that arm swing improves the stability and energy efficiency in human locomotion. Those positive effects of arm swing have been utilized in sports, especially in racewalking and sprinting.

Musculoskeletal disorder

to the unnatural biomechanical load of these postures. There is evidence that posture contributes to MSDs of the neck, shoulder, and back. Repeated motion

Musculoskeletal disorders (MSDs) are injuries or pain in the human musculoskeletal system, including the joints, ligaments, muscles, nerves, tendons, and structures that support limbs, neck and back. MSDs can arise from a sudden exertion (e.g., lifting a heavy object), or they can arise from making the same motions repeatedly (repetitive strain), or from repeated exposure to force, vibration, or awkward posture. Injuries and pain in the musculoskeletal system caused by acute traumatic events like a car accident or fall are not considered musculoskeletal disorders. MSDs can affect many different parts of the body including upper and lower back, neck, shoulders and extremities (arms, legs, feet, and hands). Examples of MSDs include carpal tunnel syndrome, epicondylitis, tendinitis, back pain...

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