

Neural Prosthesis Seminar “Powered Orthotics”

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Abstract:

Upper and lower extremity movement is a fundamental part of daily life and motor impairments can lead to a significant degradation in the quality of life. An orthosis is a medical device applied to a human limb to control or enhance movement and can range from splints to immobilize joints during the repair of damaged bone, ligament or muscle to powered exoskeletons for walking. This presentation will first review the remarkable and not-so-remarkable mechanical properties of muscles as motors, because the designer must know what they are replacing. Several concepts for untethered, powered orthotics will then be described. One uses electrical stimulation of paralyzed muscle to restore primitive walking for those with spinal cord injury. Another uses pneumatics to provide power to the ankle joint. The development of the world's smallest internal combustion engine air compressor to supply this orthosis will be described. A third concept uses tiny hydraulics. Here, a systems approach was used, which started with analysis that revealed several non-intuitive design principles that are guiding the development of novel, compact fluid power systems for portable, wearable applications.

For more information, please contact Cathy Naples at (216) 707-6490.

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