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Transcutaneous Electrical Stimulation for the Production of Functional Motion of a Human Arm

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Abstract

Persons with tetraplegia experience little to no function in their arms and are therefore unable to perform reaching tasks without assistance. While functional electrical stimulation (FES) has shown promise for restoring motion to paralyzed limbs, it is limited by issues such as muscle fatigue and atrophy. A control strategy robust enough to overcome these issues has yet to be developed and some motions are not feasible even with the most sophisticated FES control strategy. In theory, a powered exoskeleton could be used in concert with an FES system to increase the accuracy of control and assist the arm when motions are unfeasible under FES alone. The results of using a powered exoskeleton in concert with transcutaneous electrical stimulation were investigated and compared to the results of using either the exoskeleton or FES alone.