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SYSTEMS AND METHODS FOR HAND SENSORIMOTOR CAPABILITY AUGMENTATION

BY

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Abstract. In this paper the systems and methods for hand sensorimotor capability augmentation by means of FES are presented. The FES is used in combination with a force tracking system for therapeutic exercise of grasping in patients with upper limb disability. The methodologies for augmenting the force strength, reduction of spasticity and evaluation of sensorimotor capabilities are presented. The tracking system is designed to train finger flexor and extensor muscles through a force tracking task under isometric conditions. In the training, the closed-loop controlled FES is added to the tracking exercise to augment patient's voluntary activity. The actual forces are acquired by a special designed adjustable measurement device with two force sensors. The tracking system was evaluated in experimental training study with two incomplete tetraplegic patients over a period of four weeks. The results suggest that the augmentation of voluntary grip control and the increase of hand strength are possible with presented system.

Keywords: force tracking task, closed-loop FES, upper extremities, spasticity.