The Chinese University of Hong Kong

Department of Biomedical Engineering

Graduate Seminar – PhD oral Defence

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Date	:	August 21, 2018 (Tuesday)
Time	:	10:00 a.m.
Venue	:	Room 222 Ho Sin Hang Engineering Building

Title: Exoskeleton Ankle Robot for Robot-Assisted Gait Training of Stroke Patients with Foot Drop

Intensive, repetitive, and task-specific robot-assisted gait training (RAGT) could potentially enhance gait rehabilitation through experience-driven neuroplasticity. However, few studies investigate the long-term therapeutic effects of wearing robot-assisted ankle-foot-orthosis (AFO) in gait training of stroke patients with foot drop gait abnormality. In this study, the Exoskeleton Ankle Robot was developed as the first lightweight portable robot-assisted AFO to facilitate gait training over-ground and on stairs. This rehabilitation robot can provide calibrated power assistance just sufficient to facilitate active voluntary residual ankle movement for foot clearance and loading response during walking. The powered assistance is synchronized to gait phases and user walking intention (Level Walk, Stair Ascend, Stair Descend), which are classified using gait features acquired from integrated force sensitive resistors (FSR) and inertial measurement unit (IMU). This study aims to evaluate the clinical application of the powered ankle assistance on gait training of stroke patients based on its feasibility and efficacy.

In a randomized control trial (RCT) setting, nineteen chronic stroke patients presenting with foot drop were recruited to participate in 20-session RAGT wearing the robot-assisted AFO in Robotic Group (n=9) and wearing passive AFO in Sham Group (n=10). Results of clinical assessment show the Robotic Group had significantly greater improvement in gait independency (all patients had Functional Ambulatory Category FAC≥5 post-training and 3-month follow-up) compared with Sham Group. Gait analysis before and after the 20-session gait training shows the Robotic Group had greater gait confidence in weight acceptance with heel strike touchdown at initial contact of walking, while the Sham Group had reduced lower-limb range of motion. These findings suggest the power assistance from the Exoskeleton Ankle Robot could be feasible and effective as a new intervention for stroke patients with foot drop.

*****ALL ARE WELCOME*****

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