Technion-Israel Institute of Technology
Faculty of Mechanical Engineering

הטכניון-מכון טכנולוגי לישראל
הפקולטה להנדסת מכונות

סמינריון

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ה' 14.06.2018 (א' בתמוז, תשע"ח), בניין דן קאהן, אודיטוריום 1, 13:30

מרצה: מונה חורי

מנחה: פרופ'/ח אלון וולף

על הנושא:

INVESTIGATING MOTOR ADAPTATION TO UNSTABLE SHOE DESIGNS THROUGH GAIT BIOMECHANICS AND THE DYNAMICS OF THE CORTICOSPINAL CONTROL

The seminar will be given in Hebrew

תקציר ההרצאה :

Unstable footwear designs have been widely studied and implemented over the last decade as devices to strengthen muscles and train human neuromuscular control . It is well known that the use of unstable footwear designs alters gait kinematics and kinetics, activation patterns of the lower-limb musculature, and loading patterns of the foot. The underlying principle behind these designs is that instability induced during gait generates the appropriate stimuli to improve proprioception and adopt new motor control strategies. Thus, wearing unstable shoes can have both immediate and prolonged effects on gait parameters and muscle activity. An unanswered question in this puzzle remains however, is to what extent the human cortex participates in the generation and control of the process.

Recent advances in Electroencephalographic data recordings and signal analysis facilitate the measurement of EEG while walking on treadmill, and thus provide a tool for investigating the involvement of the human cortex in steady state versus challenged gait. Our main goal is to investigate adaptation strategies to unstable shoe designs and reveal how the cortical involvement in steady state gait changes when the gait is challenged, especially by wearing special bio-mechanical shoes (APOS).

This talk will review the results of a series of experiments examining the effect of unstable shoe designs on different gait measures during and after training compared to a stable shoe. Measurements include gait kinematics and kinetics, in-shoe plantar pressures, Electromyography (EMG) and Electroencephalography (EEG). First we will introduce the effect of an unstable shoe design on various gait measures and demonstrate the post-training effect of the shoe, on the movement in general and muscles activity in particular. Then we will use coherence analysis of the coupling between EEG and EMG from active leg muscles to address if changes in the activity arising in the motor cortex contributes to changes in muscle activity during gait.

The results of the proposed research provide deeper understanding of cortical involvement in both steady-state and challenged gaits and propose new insights for future investigations in neuro-rehabilitation of locomotion in general and the use of unstable shoe designs in particular.

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בברכה,

פרופ"א מתי סאס

מרכז הסמינרים