SEMINAR - סמינר

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום ב' 17.06.2019 (י"ד בסיון תשע"ט), בניין דן קאהן, אודיטוריום 1, 14:30.

מרצה:

Assoc. Prof. Miriam Zacksenhouse
Sensory Motor Integration Laboratory
&
Brain Computer Interfaces for Rehabilitation Laboratory
Faculty of Mechanical Engineering & Technion Autonomous Systems Program, Technion, Israel

על הנושא:

Neuro-inspired control and Neuro-engineering

The seminar will be given in Hebrew

להלן תקציר ההרצאה:

Neuro-inspired control: A hundred-year-old debate in human motor control suggests that the generation of rhythmic movements involves central mechanisms – known as central pattern generators, which can be modulated by feedback but do not rely on it. Inspired by this model, we have developed dynamic controllers for biped locomotion, which exploit the natural dynamics of the robot. The controllers were optimized using different machine learning methods, resulting in successful demonstrations on simulated and physical legged robots. Building on this success, we are currently addressing the challenge of developing robots that can learn to perform assembly, and in particular, assembly of deformable objects.

The control of dynamic walking can be viewed as a problem of stabilizing limit cycles of hybrid dynamical systems. I will describe two semi-analytical methods that we have developed to address this problem, involving the computation of the linearized Poincar'e map and estimation of ellipsoidal inner bounds for the basin of attraction of fixed points of the Poincar'e map.

In the broader context of human motor control, we characterized the robustness of intermittent control (IC) and continuous control (CC) to model inaccuracies. Theoretical analysis revealed that IC may remain stable even when CC leads to instability, and numerical analysis indicated that IC agrees better with certain subtle aspects of reported experimental results.

Neuro-engineering: Recent technological and decoding capabilities facilitate the development of Brain-Machine Interfaces (BMIs) that provide direct communication links between the brain and external devices, using either invasive of non-invasive measurements. Despite advances in invasive and non-invasive BMI decoders, both are prone to errors. In typical closed-loop BMI applications, the user observes the actions of the BMI, so errors made by the BMI evoke error-processing in the user's brain. I will describe our investigation of neural correlates of error processing, the insights they provide for understanding information representation and error processing in the brain, their decoding, and promising novel strategies for using the decoded information to improve BMIs and integrate the brain in robotic rehabilitation.

בברכה,

פרופ"א מרים זקסנהאוס
מרכז הסמינרים