

## סמינר - SEMINAR

הנך מוזמן/ת להרצאה סמינריונית של הפקולטה להנדסת מכונות, שתתקיים ביום בי 29.04.2019 (כייד בניסן תשע"ט), בניין דן קאהן, אודיטוריום 1, 30 .14:

<u>מרצה:</u>

### Dana Solav, PhD

Massachusetts Institute of Technology Research Scientist Biomechatronics | MIT | Media Lab

<u>על הנושא:</u>

# Modeling and Analysis of Biomechanical Interfaces

The seminar will be given in English

### להלן תקציר ההרצאה:

The prosthetic socket constitutes the mechanical interface between the residual limb of amputees and the artificial prosthesis, and is the most critical component of the lower limb prosthetic system. The main challenge is to design a socket that properly distributes the load across the soft tissues, while preventing stress concentrations in vulnerable regions. Conventional socket design is largely artisanal, non-standard, and insufficiently data-driven. A clear necessity in the field is a computational design framework which is automatic, repeatable, data-driven, and based on scientific rationale. In this talk, I will present a novel framework for the computational design of optimized patient-specific sockets. The first and most important step is obtaining a representative biomechanical model of the residual limb, including its accurate shape, deformation, and mechanical properties. This is exceptionally challenging since these measures have to be obtained in-vivo and the soft-tissue material behavior is complex and non-linear. To this end, I have developed a new imaging setup and software based on 3D digital image correlation, which provides accurate full-field measurements of the entire residuum skin. These measurements can be used in combination with data from MRI and a custom indentation device to identify the material parameters of the underlying soft tissues using inverse finite element (FE) analysis. Furthermore, I will demonstrate the capability of a custom software to iteratively execute FE analyses and use the results to inform modifications in the socket design. Finally, I will present future research directions towards optimized design of prosthetic sockets and application to other biomechanical interfaces.

#### **Short Bio**

Dana Solav received a BSc in Geophysics from Tel Aviv University (2006) and a PhD in Mechanical Engineering from the Technion Israel Institute of Technology (2016). In January 2017 she joined the MIT Media Lab's Biomechatronics group as a postdoctoral fellow, where she became a research scientist (2019) to lead the group's Computational Biomechanics research track. Her research experience includes continuum mechanics, musculoskeletal modeling, soft tissue biomechanics, and imaging methods. Her current research focuses on combined experimental and computational investigation of the mechanical interface between the residual limb of amputees and the prosthetic socket.

מארח: פרופי אולג גנדלמן

בברכה,

מרכז הסמינרים מאנרים