Seminar

Wednesday April 17th 12.15 pm, Large Meeting Room,
3rd Floor, Complesso Ingegneria Meccanica, Via Venezia 1

Presenter

Dr. Luca Modenese
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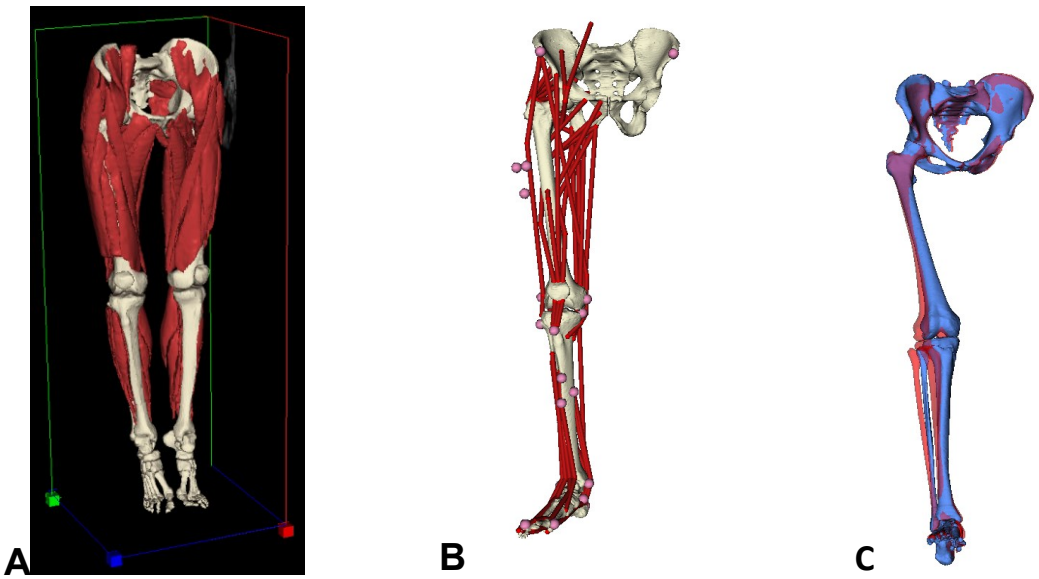
Computational Models of the Musculoskeletal System with applications in orthopedics and rehabilitation

ABSTRACT

Musculoskeletal models are computational representations of the musculoskeletal system that can be used to simulate human motion and accurately estimate forces occurring within the human body which are extremely difficult to measure, for example muscle forces and articular loadings. In this talk, after an introduction to this modelling technique, I will present recent technical developments that allow to generate accurate models of individual patients using standard medical images like magnetic resonance imaging (MRI) and computed tomography (CT). I will also give some examples of how these models can be used to create 'virtual patients' and perform 'virtual surgeries' that in the future will help surgeons to plan more successful orthopaedic interventions. The talk will close outlining some current challenges for the field.



A) bone and muscle geometries from CT and MRI scans, B) computational model of the lower limb or 'virtual patient' built from the medical images, C) example of pre-operative (red model) and post-operative (blue model) model walking after virtual surgery.

Luca Modenese graduated *cum laude* in Mechanical Engineering from the University of Padova in 2008 and was awarded a PhD in biomechanics from Imperial College London in 2013. After that, he worked as postdoctoral researcher at the Centre for Musculoskeletal Research (Griffith University, Australia) and INSIGNEO Institute for in silico Medicine (University of Sheffield, UK). In 2013, he was a visiting scholar at the National Center for Simulation in Rehabilitation Research at Stanford University. In 2017, Luca was awarded a prestigious Imperial College Research Fellowship and his current research focuses on developing computational models of the musculoskeletal system of orthopaedic patients from medical images and employ them to support pre-operative planning of surgical procedures.

Prof. Nicola Petrone is honoured to host Dr Modenese at the Department of Industrial Engineering as Visiting Scientist and invites all researchers active in the field of biomechanics and bioengineering, as well as PhD and Master students, to join the Seminar.