

Friday 26 May 2023, Time:14.30-16.30

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Symbiotic Control of Wearable Soft Suits for human motion assistance and augmentation

Abstract: Soft wearable exosuits have been introduced in the last decade as possible candidates to overcome the limitations from devices using rigid structures: the exoskeletons. Despite the Exosuits initially promised tangible improvements, yet their soft wearable architecture presents strong drawbacks, placing this technology more in a complementary position rather than on a higher step of the podium respect to their predecessors. Motivations can be found in their soft structure which not only undershoots in terms of assistance delivery respect to the exoskeletons, but also introduces non-linear dynamic behaviours making difficult the formalization of a robust control

implementation and substantially hampering the matching with the wearer’s biomechanics. During my speech I will introduce the progress from our research on soft wearable exosuits, by presenting novel solutions on mechanical design, novel implementation of control strategies based on machine learning to master the non-linear behaviours. I will discuss in details how using biosignals by means of a realtime techniques based on musculoskeletal dynamics to provide a symbiotic interface between the exosuit and the user and compared such a solution with a classical control approaches.

CV (fino a 500 car.): He started his path in robotics spending two years at the Mechanical Engineering Dept. of the Massachusetts Institute of Technology (MIT) (from Jan- 2005 to Dec 2006) working at the Newman Lab for Biomechanics and Human Rehabilitation. He was then postdoctoral researcher at the Italian Institute of Technology (IIT) in the Robotics Brain and Cognitive Sciences Department and He started his academic path as Assistant Professor at the School of Mechanical & Aerospace Engineering (MAE) at Nanyang Technological University (NTU) of Singapore (2013-2018). He was Associate Professor in Biodesign at the Department of Biomechanical Engineering of the University of Twente (The Netherlands) from June 2018 to March 2019. Now, since April 2019, He is Full Professor in Medical Technology at Heidelberg University (Germany) at the Institute of Computer Engineering or Institut für Technische Informatik (ZITI), leading the ARIES Lab (Assistive Robotics and Interactive ExoSuits).

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