



UNIVERSITA' CAMPUS BIO-MEDICO DI ROMA

NEXT: Neurophysiology and Neuroengineering of Human-Technology Interaction Research Unit

Interaction control in humans and with robots



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Abstract:

My lecture will present experiments and computational modelling to i) understand how humans learn to skilfully interact with their environment and with each other, and ii) endow robots with similarly successful control behaviours.

Impedance control describes how biological or robotic motor commands can shape the mechanical interaction with the environment. We have previously provided the first clear experimental evidence of impedance control in humans and described the underlying computational mechanism, which led to a novel adaptive behaviour for robots. This talk will first present how this behaviour can be/is used for haptic exploration of rigid and soft objects in robots and humans.

I will then concentrate on our recent research to understand how humans exchange haptic information through touch in order to coordinate their actions. By examining the behaviours of individuals when their right hands are physically connected, we could show how haptic information enables humans to estimate partners' motor plan and use it to improve one own performance. Embodied as a robot partner, this model was verified as it induced the same improvements in motor performance as a human partner. We further elucidated how the sensory exchange is influenced by the interaction mechanics and how its benefits increase with the number of partners. These results elucidate the haptic communication taking place between physically interacting humans and promise collaborative robot systems with human-like assistance.

Biosketch

Dr. Etienne Burdet is Chair of Human Robotics at the Imperial College of Science, Technology and Medicine in UK. He is also a visiting Professor at University College London. He holds an MSc in Mathematics (1990), an MSc in Physics (1991), and a PhD in Robotics (1996), all from ETH-Zurich. He was a postdoctoral fellow with TE Milner from McGill University, Canada, JE Colgate from Northwestern University, USA and Mitsuo Kawato of ATR in Japan. Professor Burdet's group uses an integrative approach of neuroscience and robotics to: i) investigate human motor control, and ii) design efficient systems for training and rehabilitation, which are tested in clinical trials and commercialised.

Seminari



Mercoledì 28 aprile 2021 - ore 11:00

Additional information:

This lecture is part of the class of Bionic Systems and Neuroengineering, but external audience is admitted upon request to Domenico Formica (d.formica@unicampus.it).

