

Impedance Control: Planning or Learning?

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Bio

Antonio Bicchi is Professor of Robotics at the University of Pisa, and Senior Scientist at the Italian Institute of Technology in Genoa. He graduated from the University of Bologna in 1988 and was a postdoc scholar at M.I.T. Artificial Intelligence lab in 1988–1990. He teaches Robotics and Control Systems in the Department of Information Engineering (DII) of the University of Pisa. He leads the Robotics Group at the Research Center "E. Piaggio" of the University of Pisa since 1990, where he was Director from 2003 to 2012. He is the head of the SoftRobotics Lab for Human Cooperation and Rehabilitation at IIT in Genoa. Since 2013 he serves as Adjunct Professor at the School of Biological and Health Systems Engineering of Arizona State University.

His work has been recognized with many international awards and has earned him four prestigious grants from the European Research Council (ERC). He launched initiatives such as the WorldHaptics conference series, the IEEE Robotics and Automation Letters, and the Italian Institute of Robotics and Intelligent Machines.

Abstract

Humans are able to modulate their mechanical impedance depending on the task they are performing. This capability has been transferred also to robotic systems, either via software or using hardware solutions. Impedance modulation in robotics found fertile application to solve multiple problems ranging from manipulation to rehabilitation, from locomotion to prosthetics. In this talk, I will first review how humans exploit their capabilities in changing and adapting their limb impedance. Then, I will discuss different solutions to mirror this behavior in machines. Finally, I will present and results in planning, controlling and learning robot impedance to solve a variety of practical issues.