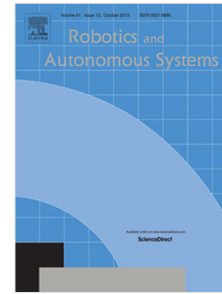


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## Robotic Wrist Training after Stroke: Adaptive Modulation of Assistance in Pediatric Rehabilitation

Francesca Marini<sup>1</sup>, Charmayne M. L. Hughes<sup>2</sup>, Valentina Squeri<sup>1</sup>, Luca Doglio<sup>3</sup>, Paolo Moretti<sup>3</sup>, Pietro Morasso<sup>1</sup>, Lorenzo Masia<sup>4\*</sup>

<sup>1</sup>*Department of Robotics, Brain and Cognitive Sciences, Istituto Italiano di Tecnologia, Genova, Italy*

<sup>2</sup>*Department of Kinesiology, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132*

<sup>3</sup>*Physical Medicine and Rehabilitation Institute G. Gaslini, Genova, Italy*

<sup>4</sup>*Robotics Research Centre, School of Mechanical and Aerospace Engineering, Nanyang Technological University, 50 Nanyang Ave, Singapore 639798*

\* *Corresponding author: lorenzo.masia@ntu.edu.sg*

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### Abstract

In this paper we present a case study in which a 14-year-old, right-handed stroke patient with severe weakness, spasticity, and motor dysfunction of the left upper extremity participated in a three-month distal robotic training program. The robotic device was compliant to the patients movements and was able to modulate the level of assistance continuously throughout the trial (i.e., online adaptive modulation). Standard clinical and robotic evaluations of upper extremity motor performance were conducted before and after robotic training. There were improvements in upper extremity spasticity and motor functions. In addition, robotic training lead to positive changes in wrist active range of motion and kinematics: movements were smoother and there was a noticeable decrease in the level of robotic intervention required to complete each trial. In sum, results of the present case study demonstrate that distal upper extremity robotic rehabilitation that features the proposed adaptive control algorithm promoted positive changes in upper limb motor coordination and function after pediatric stroke.

*Keywords:* Motor dysfunction, robotic rehabilitation, pediatric stroke, wrist

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