

Novel Neuro-robotic Solutions: Hybridness and Customization to restore Quality of Life

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Abstract

Neuroengineering is a novel discipline combining engineering including micro and nanotechnology, electrical and mechanical, and computer science with cellular, molecular, cognitive neuroscience with two main goals: (i) increase our basic knowledge of how the nervous system works; (ii) develop systems able to restore functions in people affected by different types of neural disability. In this presentation, some research activities on this topic carried out by my laboratory in the past years will be presented. First, the recent results achieved after the implantation of intraneural electrodes in an amputee will be presented. We showed that using this approach it is possible to restore the bidirectional connection between a dexterous hand prosthesis and the nervous system. Secondly, our recent results to develop the first closed-loop vestibular neuroprostheses will be also briefly described showing the potentials of the approach to significantly improve the quality of life of disabled subjects. Finally, the results achieved during recent translational experiments to improve the efficacy of robot-mediated neurorehabilitation will be also shown.