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Sommario/riassunto	<p>Millions of people worldwide are affected by neurological disorders which disrupt the connections within the brain and between brain and body causing impairments of primary functions and paralysis. Such a number is likely to increase in the next years and current assistive technology is yet limited. A possible response to such disabilities, offered by the neuroscience community, is given by Brain-Machine Interfaces (BMIs) and neuroprostheses. The latter field of research is highly multidisciplinary, since it involves very different and disperse scientific communities, making it fundamental to create connections and to join research efforts. Indeed, the design and development of neuroprosthetic devices span/involve different research topics such as: interfacing of neural systems at different levels of architectural complexity (from in vitro neuronal ensembles to human brain), bio-artificial interfaces for stimulation (e.g. micro-stimulation, DBS: Deep Brain Stimulation) and recording (e.g. EMG: Electromyography, EEG: Electroencephalography, LFP: Local Field Potential), innovative signal processing tools for coding and decoding of neural activity, biomimetic artificial Spiking Neural Networks (SNN) and neural network modeling. In order to develop functional communication with the nervous system and to create a new generation of neuroprostheses, the study of closed-loop systems is mandatory. It has been widely recognized that closed-loop neuroprosthetic systems achieve more favorable outcomes for users than equivalent open-loop devices. Improvements in task</p>

performance, usability, and embodiment have all been reported in systems utilizing some form of feedback. The bi-directional communication between living neurons and artificial devices is the main final goal of those studies. However, closed-loop systems are still uncommon in the literature, mostly due to requirement of multidisciplinary effort. Therefore, through eBook on closed-loop systems for next-generation neuroprostheses, we encourage an active discussion among neurobiologists, electrophysiologists, bioengineers, computational neuroscientists and neuromorphic engineers. This eBook aims to facilitate this process by ordering the 25 contributions of this research in which we highlighted in three different parts: (A) Optimization of different blocks composing the closed-loop system, (B) Systems for neuromodulation based on DBS, EMG and SNN and (C) Closed-loop BMIs for rehabilitation.
