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Note generali	Includes index.
Nota di contenuto	Editorial / Excerps -- Subcellular Compartmentalization for Neurobiology: Focusing on the Axon -- Microfluidic Culture Platforms in Neuroscience Research -- Flexible and Soft Materials and Devices for Neural Interface -- Coatings for Microneural Implants: Biological and Mechanical Considerations -- Coatings for Microneural Implants: Electrical Considerations -- Quantitative Assessment of the Mechanical Properties of the Neural Interface -- Biomimetic Approaches Towards Device-Tissue Integration -- Implantable Device Fabrication and Packaging -- State-of-the-Art Technology on MEAs for Interfacing Live Neurons -- Distributed Neural Interfaces: Challenges and Trends in Scaling Implantable Technology -- Challenges for Large Scale Brain-Machine Interfaces -- Organic Bioelectronics -- High-Density Fiberless

Optoelectrodes with Integrated Waveguides and LEDs -- Nanostructured Platforms Interfacing with Nervous System -- Neuroflex: Intraneural and Extraneural Flexible Sensor Architectures for Neural Probing -- Regenerative Electrodes for Peripheral Nerve Interfacing -- Neurochemical Sensing -- Ultrasonic Wireless Neural Recording and Stimulation Interfaces -- Neural Drug Delivery -- Design Considerations for Implantable Neural Circuits and Systems -- Neuroprosthesis and Functional Electrical Stimulation (Peripheral) -- Analogue Front-End Design for Neural Recording -- Implantable Direct Current Neural Modulation -- Energy-Efficient Electrical Stimulation Systems -- Wireless Bioelectronic Interfaces Electromagnetic Performance and Safety -- State-of-the-art technology on Highly Miniaturized Free-Floating Neural Implants -- Peripheral Neural Interfaces (PNIs) for Decoding Motor Intentions and Encoding Somatosensations in Upper-Limb Amputees -- Modeling Peripheral Nerve Stimulation -- Spinal Interfacing via Muscle Recordings for Neuroprosthesis Control -- Towards a wireless implantable brain-machine interface for locomotion control -- Visual Prostheses: Neuroengineering Handbook -- Vision: Optogenetics Addressing AMD Diseases -- Brain-Machine Interfaces for Upper and Lower Limb Prostheses -- Developing a Neuroprosthesis for Memory: The Past, Present, and Future -- Noninvasive and Invasive BCIs and Hardware and Software Components for BCIs -- Brain Co-processors: Using AI to Restore and Augment Brain Function -- Artificial Sensory Feedback to the Brain: Somatosensory Feedback for Neural Devices and BCI -- Brain-Computer Interface for Stroke Rehabilitation -- Brain-Machine Interfaces for Closed-Loop Electrical Brain Stimulation in Neuropsychiatric Disorders -- Brain-machine interfaces: from restoring sensorimotor control to augmenting cognition -- Motor BMIs Have Entered the Clinical Realm -- Neuromorphic Neural Interfaces -- Neuromorphic Circuits and Systems: From Neuron Models to Integrate-and-Fire Arrays -- Neuromorphic spiking neural network algorithms -- Programming Neuromorphics Using the Neural Engineering Framework -- Sensing-to-Learn and Learning-to-Sense: Principles for Designing Neuromorphic Sensors -- Neuromorphic Tactile Sensing and Encoding -- Neuromorphic Sensing, Perception and Control for Robotics -- Emerging Technologies in Neuroengineering to Advance Rehabilitation, Improve Quality of Care Delivery, and Encourage Independent Living -- Neural Interfaces involving the CNS and PNS combined with upper limb actuators for motor rehabilitation after stroke: technical and clinical considerations -- Hybrid robotics and neuroprosthetics for associative neurorehabilitation -- Neuroprosthesis and Functional Electrical Stimulation (Peripheral) -- Brain-Machine Interfaces for Neurorobotics -- Neurorehabilitation with Virtual and Augmented Reality Tools -- Content Augmentation in Virtual Reality with Cognitive-Conflict-Based Brain-Computer Interface -- Neuroengineering of the Upper Limb: Manipulation of the Peripheral and Central Nervous System to Improve Function -- Optimal and Adaptive Stimulation Design -- Mechanisms and Targeting of Deep-Brain Stimulation Therapies -- Noninvasive Electrical Brain Stimulation of the Central Nervous System -- Transcranial Ultrasound Stimulation -- Biophysics and Mechanisms of Spinal Cord Stimulation for Chronic Pain -- Modeling of the Peripheral Nerve to Investigate Advanced Neural Stimulation (Sensory Neural Prosthesis) -- Closed-Loop Visceral Bioelectronics Therapies -- Models for Closed-Loop Cardiac Control Using Vagal Nerve Stimulation -- Sacral Nerve Stimulation for Gastrointestinal Disorders -- Sudden Deaths: A Failure of Feedback Control -- Electrical Block of Peripheral Nerves -- EEG Models and Analysis -- EEG-Based Machine Learning:

Theory and Applications -- Neural Encoding and Decoding -- State Space Models for Spike Data -- Quantitative Modeling on Nonstationary Neural Spikes: From Reinforcement Learning to Point Process -- Real-Time Detection of Acute Pain Signals Based on Spikes/LFP -- Graph Theory for Brain Signal Processing -- Neuroscience of Cognitive Functions: From Theory to Applications -- Brain's Networks and Their Functional Significance in Cognition -- Cognitive State Analysis, Understanding, and Decoding from the Perspective of Brain Connectivity -- Vigilance Assessment and Enhancement -- Cognitive State Assessment and Monitoring: A Brain Connectivity Perspective -- Deep Learning Methods for EEG Neural Classification -- Consumer Neuroscience: A Neural Engineering Approach -- Multimodal Neuroimaging with Simultaneous fMRI and EEG -- Structural Neuroimaging: From Macroscopic to Microscopic Scales -- Shape Diffeomorphometry of Brain Structures in Neurodegeneration and Neurodevelopment -- Mapping Brain Networks Using Multimodal Data -- Multimodal and Multiparametric Neuroimaging of Gliomas -- Functional Monitoring and Imaging in Deep Brain Structures -- Optical Imaging of Epileptic Seizures -- Photoacoustic Imaging Tools for Neurological Applications -- Quantitative EEG Analysis in Intensive Care Patients -- Using Connectivity to Explain Neuropsychiatric Conditions: The Example of Autism -- Determining the Role of Synchrony Dynamics in Epileptic Brain Networks -- Computational Approaches for Diagnosis and Monitoring of Epilepsy from Scalp EEG -- Somatosensory neuromodulation with a focus towards clinical systems -- A Neuroprosthetic for Individuals with Tetraplegia: The path from a clinical research tool to a home-use assistive device -- Towards Real-World Neuromonitoring and Applications in Cognitive Engineering -- The 2020 Roadmap for Bioelectronic Medicine -- Neurotechnology: Patenting Roadmap -- Quality Management Systems for Neural Engineering: Principles and Practices -- Invasive Neural Integration and Clinical Translation -- Neurosurgical Considerations for the Brain Computer Interface -- Developing ethical guidelines for implantable neurotechnology: The importance of incorporating stakeholder input.

Sommario/riassunto

This Handbook serves as an authoritative reference book in the field of Neuroengineering. Neuroengineering is a very exciting field that is rapidly getting established as core subject matter for research and education. The Neuroengineering field has also produced an impressive array of industry products and clinical applications. It also serves as a reference book for graduate students, research scholars and teachers. Selected sections or a compendium of chapters may be used as "reference book" for a one or two semester graduate course in Biomedical Engineering. Some academicians will construct a "textbook" out of selected sections or chapters. The Handbook is also meant as a state-of-the-art volume for researchers. Due to its comprehensive coverage, researchers in one field covered by a certain section of the Handbook would find other sections valuable sources of cross-reference for information and fertilization of interdisciplinary ideas. Industry researchers as well as clinicians using neurotechnologies will find the Handbook a single source for foundation and state-of-the-art applications in the field of Neuroengineering. Regulatory agencies, entrepreneurs, investors and legal experts can use the Handbook as a reference for their professional work as well.