Perelman / Ginosar

The NeuroProcessor

An Integrated Interface to Biological Neural Networks

Understanding brain structure and principles of operation is one of the major challengesofmodernscience.SincetheexperimentsbyGalvanionfrogmuscle contraction in 1792, it is known that electrical impulses lie at the core of the brain activity. The technology of neuro-electronic interfacing, besides its importance for neurophysiological research, has also clinical potential, so called neuropr- thetics. Sensory prostheses are intended to feed sensory data into patient’s brain by means of neurostimulation. Cochlear prostheses [1] are one example of sensory prostheses that are already used in patients. Retinal prostheses are currently under research [2]. Recent neurophysiological experiments [3, 4] show that brain signals recorded from motor cortex carry information regarding the movement of subject’s limbs (Fig. 1.1). These signals can be further used to control ext- nal machines [4] that will replace missing limbs, opening the ?eld of motor prosthetics, devices that will restore lost limbs or limb control. Fig. 1.1. Robotic arm controlled by monkey motor cortex signals. MotorLab, U- versity of Pittsburgh. Prof Andy Schwartz, U. Pitt 2 1 Introduction Another group of prostheses would provide treatment for brain diseases, such as prevention of epileptic seizure or the control of tremor associated with Parkinson disease [5]. Brain implants for treatment of Epilepsy and Parkinson symptoms (Fig. 1.2) are already available commercially [6, 7]. Fig. 1.2. Implantable device for Epilepsy seizures treatment [7]. Cyberonics, Inc.

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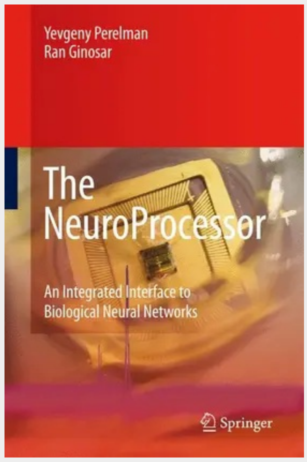

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