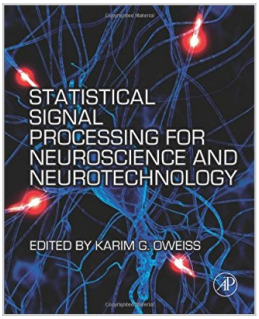

Statistical Signal Processing for Neuroscience and Neurotechnology

From Academic Press

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This is a uniquely comprehensive reference that summarizes the state of the art of signal processing theory and techniques for solving emerging problems in neuroscience, and which clearly presents new theory, algorithms, software and hardware tools that are specifically tailored to the nature of the neurobiological environment. It gives a broad overview of the basic principles, theories and methods in statistical signal processing for basic and applied neuroscience problems.

Written by experts in the field, the book is an ideal reference for researchers working in the field of neural engineering, neural interface, computational neuroscience, neuroinformatics, neuropsychology and neural physiology. By giving a broad overview of the basic principles, theories and methods, it is also an ideal introduction to statistical signal processing in neuroscience.

- A comprehensive overview of the specific problems in neuroscience that require application of existing and development of new theory, techniques, and technology by the signal processing community
- Contains state-of-the-art signal processing, information theory, and machine learning algorithms and techniques for neuroscience research
- Presents quantitative and information-driven science that has been, or can be, applied to basic and translational neuroscience problems

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Editorial Review

Review

"Large-scale recording of multiple single neurons has become an indispensable tool in system neuroscience. The chapters of this edited volume will take the reader from spike detection and processing through analyses to modeling and interpretation. Both experimentalists and theorists will benefit from the well-condensed and organized content."

György Buzsáki, M.D., Ph.D. Center for Molecular and Behavioral Neuroscience Rutgers University

From the Back Cover

This is a uniquely comprehensive reference that summarizes the state of the art of signal processing and machine learning theory and techniques applied to emerging problems in neuroscience, with special emphasis on basic and clinical applications of neurotechnology. Written by experts in the field, the book is an ideal reference for engineering researchers and graduate students working in the field of neural engineering, neuroprosthesis, brain machine and brain computer interfaces, computational and systems neuroscience, neuroinformatics, and neurophysiology. It provides a broad overview of the basic principles, theories and methods of statistical signal processing, information theory and machine learning and their applications in neuroscience.

Features:

- Provides a comprehensive overview of classical and modern signal processing theory and techniques for analyzing neural data
- Presents quantitative and information-driven science that has been, or can be, applied to basic and translational neuroscience problems
- Discusses practical implementation issues and design considerations for neurotechnology, particularly related to neuroprosthetic and brain machine interface system design.

Karim G. Oweiss received his Ph.D. in Electrical Engineering and Computer Science from the University of Michigan, Ann Arbor in 2002 and has been with the Department of Electrical and Computer Engineering and the Neuroscience program at Michigan State University since 2003. He is a member of the IEEE and Society for Neuroscience and was awarded the excellence in Neural Engineering award from the National Science Foundation in 2001.

"Large-scale recording of multiple single neurons has become an indispensable tool in system neuroscience. The chapters of this edited volume will take the reader from spike detection and processing through analyses to modeling and interpretation. Both experimentalists and theorists will benefit from the well-condensed and organized content."

György Buzsáki, M.D., Ph.D., Center for Molecular and Behavioral Neuroscience, Rutgers University

About the Author

Karim G. Oweiss received his B.S. (1993) and M.S. (1996) degrees with honors in electrical engineering from the University of Alexandria, Egypt, and his Ph.D. (2002) in electrical engineering and computer science from the University of Michigan, Ann Arbor. In that year he also completed postdoctoral training with the Department of Biomedical Engineering at the University of Michigan. In 2003, he joined the Department of Electrical and Computer Engineering and the Neuroscience Program at Michigan State University, where he is currently an associate professor and director of the Neural Systems Engineering Laboratory. His research interests are in statistical signal processing, information theory, machine learning, and control theory, with direct applications to studies of neuroplasticity, neural integration and coordination in sensorimotor systems, neurostimulation and neuromodulation in brain-machine interfaces, and computational neuroscience.

Professor Oweiss is a member of the IEEE and the Society for Neuroscience. He served as a member of the board of directors of the IEEE Signal Processing Society on Brain-Machine Interfaces and is currently an active member of the technical and editorial committees of the IEEE Biomedical Circuits and Systems Society, the IEEE Life Sciences Society, and the IEEE Engineering in Medicine and Biology Society. He is also associate editor of IEEE Signal Processing Letters, Journal of Computational Intelligence and Neuroscience, and EURASIP Journal on Advances in Signal Processing. He currently serves on an NIH Federal Advisory Committee for the Emerging Technologies and Training in Neurosciences. In 2001, Professor Oweiss received the Excellence in Neural Engineering Award from the National Science Foundation.

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