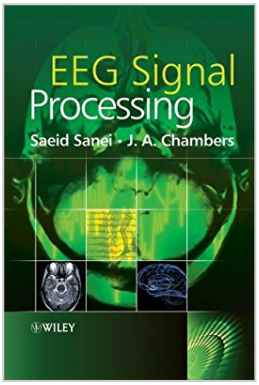

EEG Signal Processing

By Saeid Sanei, Jonathon A. Chambers

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Electroencephalograms (EEGs) are becoming increasingly important measurements of brain activity and they have great potential for the diagnosis and treatment of mental and brain diseases and abnormalities. With appropriate interpretation methods they are emerging as a key methodology to satisfy the increasing global demand for more affordable and effective clinical and healthcare services.

Developing and understanding advanced signal processing techniques for the analysis of EEG signals is crucial in the area of biomedical research. This book focuses on these techniques, providing expansive coverage of algorithms and tools from the field of digital signal processing. It discusses their applications to medical data, using graphs and topographic images to show simulation results that assess the efficacy of the methods.

Additionally, expect to find:

- explanations of the significance of EEG signal analysis and processing (with examples) and a useful theoretical and mathematical background for the analysis and processing of EEG signals;
- an exploration of normal and abnormal EEGs, neurological symptoms and diagnostic information, and representations of the EEGs;
- reviews of theoretical approaches in EEG modelling, such as restoration, enhancement, segmentation, and the removal of different internal and external artefacts from the EEG and ERP (event-related potential) signals;
- coverage of major abnormalities such as seizure, and mental illnesses such as dementia, schizophrenia, and Alzheimer’s disease, together with their mathematical interpretations from the EEG and ERP signals and sleep phenomenon;
- descriptions of nonlinear and adaptive digital signal processing techniques for abnormality detection, source localization and brain-computer interfacing using multi-channel EEG data with emphasis on non-invasive techniques, together with future topics for research in the area of EEG signal processing.

The information within *EEG Signal Processing* has the potential to enhance the clinically-related information within EEG signals, thereby aiding physicians and ultimately providing more cost effective, efficient diagnostic tools. It will be beneficial to psychiatrists, neurophysiologists, engineers, and students or researchers in neurosciences. Undergraduate and postgraduate biomedical engineering students and postgraduate epileptology students will also find it a

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Editorial Review

From the Back Cover
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About the Author
Dr. Sanei received his PhD from Imperial College of Science, Technology, and Medicine, London, in Biomedical Signal and Image Processing in 1991. His major interest is in biomedical signal and image processing, adaptive and nonlinear signal processing, pattern recognition and classification. He has had a major contribution to Electroencephalogram (EEG) analysis such as epilepsy prediction, cognition evaluation, and brain computer interface (BCI). Currently, he is involved in teaching various undergraduate and postgraduate subjects such as Real-time Signal Processing, Non-linear and Adaptive Signal & Image processing, Intelligent Signal Processing, VHDL based Digital Signal Processing, and Digital Design.

Jonathon Chambers joined the Cardiff School of Engineering in January 2004 and leads a team of researchers involved in the analysis, design and evaluation of new algorithms for digital signal processing with application in acoustics, biomedicine and beyond 3G wireless communications, and is the Director of

the Centre of Digital Signal Processing and the Group Leader of the Telecommunications and Information Technology Group.

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