

**SPECIAL ISSUE**

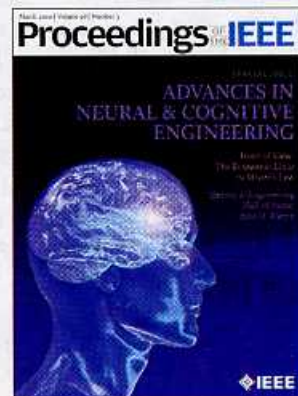
**ADVANCES IN NEURAL & COGNITIVE ENGINEERING**

Edited by M. Akay

- 356 **The Neurobiological Basis of Cognition: Identification by Multi-Input, Multioutput Nonlinear Dynamic Modeling**  
By T. W. Berger, D. Song, R. H. M. Chan, and V. Z. Marmarelis  
| INVITED PAPER | A method is proposed for measuring and modeling human long-term memory formation by mathematical analysis and computer simulation of nerve-cell dynamics.
- 375 **Listening to Brain Microcircuits for Interfacing With External World—Progress in Wireless Implantable Microelectronic Neuroengineering Devices**  
By A. V. Nurmikko, J. P. Donoghue, L. R. Hochberg, W. R. Patterson, Y.-K. Song, C. W. Bull, D. A. Borton, F. Laiwalla, S. Park, Y. Ming, and J. Aceros  
| INVITED PAPER | Experimental systems are described for electrical recording in the brain using multiple microelectrodes and short range implantable or wearable broadcasting units.
- 389 **In vitro Verification of a 3-D Regenerative Neural Interface Design: Examination of Neurite Growth and Electrical Properties Within a Bifurcating Microchannel Structure**  
By P. A. Wieringa, R. W. F. Wiertz, E. L. de Weerd, and W. L. C. Rutten  
| INVITED PAPER | Implantable devices that guide growth of multiple neurites are used to prompt cell separation and improve selective neural interfaces.
- 398 **Designing Neural Networks in Culture**  
By B. C. Wheeler and G. J. Brewer  
| INVITED PAPER | Experiments are described for controlled growth, of nerve cells taken from rats, in predesigned geometrical patterns on laboratory culture dishes.
- 407 **Decoding Information From Neural Signals Recorded Using Intraneural Electrodes: Toward the Development of a Neurocontrolled Hand Prosthesis**  
By S. Micera, L. Citi, J. Rigosa, J. Carpaneto, S. Raspopovic, G. Di Pino, L. Rossini, K. Yoshida, L. Denaro, P. Dario, and P. M. Rossini.  
| INVITED PAPER | Progress is described in using information, obtained by processing nerve cell signals in bundles of muscle fibers, as a means to model hand movements and to control prosthetic devices.
- 418 **Biological-Machine Systems Integration: Engineering the Neural Interface**  
By N. H. Lovell, J. W. Morley, S. C. Chen, L. E. Hallum, and G. J. Suaning  
| INVITED PAPER | Laboratory experiments to create interfaces using electrodes designed to stimulate or record nerve cell activity have had limited success but more research is said to be needed.

**DEPARTMENTS**

- 351 **POINT OF VIEW.**  
The Economic Limit to Moore's Law  
By K. Rupp and S. Selberherr
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**On the Cover:** This month our cover illustration highlights the human brain as a focal point for this special issue on Advances in Neural and Cognitive Engineering.

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## SPECIAL ISSUE: ADVANCES IN NEURAL &amp; COGNITIVE ENGINEERING

- 432 Multichannel Intraneural and Intramuscular Techniques for Multiunit Recording and Use in Active Prostheses**  
By *K. Yoshida, D. Farina, M. Akay, and W. Jensen*  
| INVITED PAPER | Analysis of the development and experimental efforts on neural prosthetic interfaces and their potential application in hand prostheses.
- 450 A Novel Approach to Monitor Rehabilitation Outcomes in Stroke Survivors Using Wearable Technology**  
By *S. Patel, R. Hughes, T. Hester, J. Stein, M. Akay, J. G. Dy, and P. Bonato*  
| INVITED PAPER | Accelerometer data is being used to evaluate the success of rehabilitation efforts on movements, from shoulder to finger tips, for patients who have suffered strokes.
- 462 In a Blink of an Eye and a Switch of a Transistor: Cortically Coupled Computer Vision**  
By *P. Sajda, E. Pohlmeier, J. Wang, L. C. Parra, C. Christoforou, J. Dmochowski, B. Hanna, C. Bahlmann, M. K. Singh, and S.-F. Chang*  
| INVITED PAPER | To identify "interesting" images, human observers view 10 images/sec, while electroencephalography (EEG) signals from the observers own brains are automatically decoded.
- 479 The Geometry of Visual Perception: Retinotopic and Nonretinotopic Representations in the Human Visual System**  
By *H. Öğmen and M. H. Herzog*  
| INVITED PAPER | This paper discusses the shortcomings of retinotopic representations which are camera-like flat images of three-dimensional objects created by orderly projections from retina to visual cortex.

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