Neural Engineering Research

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Penn State has a new cross-disciplinary program to train graduate students interested in the complex landscape of the human brain, supported by a $1.5 million grant from the National Institutes of ...

National Institutes of Health funds neural engineering graduate training program
Penn State has a new cross-disciplinary program to train graduate students interested in the complex landscape of the human brain, supported by a $1.5 million grant from the National Institutes of ...

Penn State's neural engineering training program receives support from NIH
Researchers have created a neural network that can help tweak semiconductor crystals in a controlled fashion to achieve superior properties for electronics. This enables a new direction of development ...

Putting a strain on semiconductors for next-gen chips
"This research opens several avenues for future work. As neuroscientists, we are interested in developing a more detailed understanding of neural signaling pathways in texture discrimination ...

The rat's whiskers: Multidisciplinary research reveals how we sense texture
Innatera, the pioneering Dutch neuromorphic processor company, announced the appointment of Prof. Alberto L. Sangiovanni-Vincentelli as Chairman of its Board of Directors.

Neuromorphic processor leader Innatera appoints Prof. Alberto Sangiovanni-Vincentelli Chairman of Board
The chaotically moving objects dense clusters digital twin is being developed by students from NUST MISIS, ITMO and MIPT to navigate robots. It is going to be a web service using graph neural networks ...

Neural network to study crowd physics for training urban robots
Neural tube defects are among the most common ... ethnic backgrounds and genders with this interdisciplinary bioengineering research, and encourage them to pursue science and engineering careers. This ...

Biomechanical Regulation in Human Neural Induction
The July 2021 issue of IEEE/CAA Journal of Automatica Sinica features six articles that showcase the potential of machine learning in its various forms. The applications described in the studies range ...

Smarter by the minute: Myriad of applications unlocked by artificial intelligence
A team of researchers has submitted the system to the Cough Sound Track of the Diagnosing COVID-19 using Acoustics (DiCOVA) Challenge. The covid-19 crisis has tested healthcare systems throughout the ...

Detection of COVID-19 via Automatic Artificial Intelligence Cough Analysis
Their work was recently published in the research journal Molecular ... could put brain tumors to sleep: Engineering researchers discover and explore new neural stem cell state that gives insight ...

Sleeper cells: Newly discovered stem cell resting phase could put brain tumors to sleep
This month has seen some innovative advances with Alzheimer’s research, representing an important area of research as the global population continues to age. Digital Journal loo ...

Advances in Alzheimer’s disease research
Even the mundane act of swallowing requires a well-coordinated dance of more than 30 muscles of the mouth. The loss of function of even one of these, ...

Research lays groundwork for restoring lost oral functions with pacemaker-like devices
A new mouse study showed how one dose of psilocybin led to an immediate, long-lasting increase in the number and strength of connections between neurons.

Psychedelic Compound in “Magic Mushrooms” Prompts Growth of Neural Connections Lost in Depression
Participation in weekly dance training classes "drastically" reduced the expected decline in motor function and improved quality of life in a study of patients with mild to moderate Parkinson's ...

Dance Training 'Drastically' Reduces Parkinson's Progression, Eases Symptoms
The patent covers a unique approach to applying human-induced Pluripotent Stem Cells (iPSCs) as a powerful tool to illuminate the biology of complex human cell types such as those of the central ...

Vyant Bio Announces Issuance of Key Patent for High-Throughput Optical Assay of Human Mixed ...
New findings suggest it may be possible to develop treatments for people who have different disorders with common behavioral symptoms.

Cognitive Impairments in Autism and Schizophrenia Share Similar Neural Mechanism
Mandi, working together with their counterparts at the Central Potato Research Institute (CPRI) in Shimla, have developed an AI solution that can detect diseases of the tuber crop simply by examining ...

IIT Mandi research yields an app for detecting potato blight
How we sense texture has long been a mystery. It is known that nerves attached to the fingertip skin are responsible for sensing different surfaces, ...

Rat’s whiskers: Multidisciplinary research reveals how we sense texture
Fulton Schools of Engineering at Arizona State University, and Samantha O'Connor, a biomedical engineering doctoral student in the Plaisier Lab, are leading research ... in the Neural G0 or ...

A synthesis of current approaches to adapting engineering tools to the study of neurobiological systems.

Neural Engineering for Autism Spectrum Disorder, Volume One: Imaging and Signal Analysis Techniques presents the latest advances in neural engineering and biomedical engineering as applied to the clinical diagnosis and treatment of Autism Spectrum Disorder (ASD). Advances in the role of neuroimaging, infrared spectroscopy, sMRI, fMRI, DTI, social behaviors and suitable data analytics useful for clinical diagnosis and research applications for Autism Spectrum Disorder are covered, including relevant case studies. The application of brain signal evaluation, EEG analytics, feature selection, and analysis of blood oxygen level-dependent (BOLD) signals are presented for detection and estimation of the degree of ASD. Presents applications of Neural Engineering and other Machine Learning techniques for the diagnosis of Autism Spectrum Disorder (ASD) Includes in-depth technical coverage of imaging and signal analysis techniques, including coverage of functional MRI, neuroimaging, infrared spectroscopy, sMRI, fMRI, DTI, and neuroanatomy of autism Covers Signal Analysis for the detection and estimation of Autism Spectrum Disorder (ASD), including brain signal analysis, EEG analytics, feature selection, and analysis of blood oxygen level-dependent (BOLD) signals for ASD Written to help engineers, computer scientists, researchers and clinicians understand the technology and applications of Neural Engineering for the detection and diagnosis of Autism Spectrum Disorder (ASD)

An important new work establishing a foundation for future developments in neural engineering The Handbook of Neural Engineering provides theoretical foundations in computational neural science and engineering and current applications in wearable and implantable neural sensors/probes. Inside, leading experts from diverse disciplinary groups representing academia, industry, and private and government organizations present peer-reviewed contributions on the brain-computer interface, nano-neural engineering, neural prostheses, imaging the brain, neural signal processing, the brain, and neurons. The Handbook of Neural Engineering covers: Neural signal and image processing--the analysis and modeling of neural activity and EEG-related activities using the nonlinear and nonstationary analysis methods, including the chaos, fractal, and time-frequency and time-scale analysis methods--and how to measure functional, physiological, and metabolic activities in the human brain using current and emerging medical imaging technologies Neuro-nanotechnology, artificial implants, and neural prosthesis--the design of multi-electrode arrays to study how the neurons of human and animals encode stimuli, the evaluation of functional changes in neural networks after stroke and spinal cord injuries, and improvements in therapeutic applications using neural prostheses Neurorobotics and neural rehabilitation engineering--the recent developments in the areas of biorobotic system, biosonar head, limb kinematics, and robot-assisted activity to improve the treatment of elderly subjects at the hospital and home, as well as the interactions of the neuron chip, neural information processing, perception and neural dynamics, learning memory and behavior, biological neural networks, and neural control

Neural Engineering, 2nd Edition, contains reviews and discussions of contemporary and relevant topics by leading investigators in the field. It is intended to serve as a textbook at the graduate and advanced undergraduate level in a bioengineering curriculum. This principles and applications approach to neural engineering is essential reading for all academics, biomedical engineers, neuroscientists, neurophysiologists, and industry professionals wishing to take advantage of the latest and greatest in this emerging field.

Description based on: v. 2, copyrighted in 2012.

This book focuses on neuro-engineering and neural computing, a multi-disciplinary field of research attracting considerable attention from engineers, neuroscientists, microbiologists and material scientists. It explores a range of topics concerning the design and development of innovative neural and brain interfacing technologies, as well as novel information acquisition and processing algorithms to make sense of the acquired data. The book also highlights emerging trends and advances regarding the applications of neuro-engineering in real-world scenarios, such as neural prostheses, diagnosis of neural degenerative diseases, deep brain stimulation, biosensors, real neural network-inspired artificial neural networks (ANNs) and the predictive modeling of information flows in neuronal networks. The book is broadly divided into three main sections including: current trends in technological developments, neural computation techniques to make sense of the neural behavioral data, and application of these technologies/techniques in the medical domain in the treatment of neural disorders.

Neural engineering is a discipline that uses engineering techniques to understand, repair, replace, enhance, or treat diseases of neural systems. Currently, no book other than this one covers this broad range of topics within motor rehabilitation technology. With a focus on cutting edge technology, it describes state-of-the-art methods within this field, from brain-computer interfaces to spinal and cortical plasticity. Touching on electrode design, signal processing, the neurophysiology of movement, robotics, and much more, this innovative volume collects the latest information for a wide range of readers working in biomedical engineering.

How powerful new methods in nonlinear control engineering can be applied to neuroscience, from fundamental model formulation to advanced medical applications. Over the past sixty years, powerful methods of model-based control engineering have been responsible for such dramatic advances in engineering systems as autolanding aircraft, autonomous vehicles, and even weather forecasting. Over those same decades, our models of the nervous system have evolved from single-cell membranes to neuronal networks to large-scale models of the human brain. Yet until recently control theory was completely inapplicable to the types of nonlinear models being developed in neuroscience. The revolution in nonlinear control engineering in the late 1990s has made the intersection of control theory and neuroscience possible. In Neural Control Engineering, Steven Schiff seeks to bridge the two fields, examining the application of new methods in nonlinear control engineering to neuroscience. After presenting extensive material on formulating computational neuroscience models in a control environment—including some fundamentals of the algorithms helpful in crossing the divide from intuition to effective application—Schiff examines a range of applications, including brain-machine interfaces and neural stimulation. He reports on research that he and his colleagues have undertaken showing that nonlinear control theory methods can be applied to models of single cells, small neuronal networks, and large-scale networks in disease states of Parkinson's disease and epilepsy. With Neural Control Engineering the reader acquires a working knowledge of the fundamentals of control theory and computational neuroscience sufficient not only to understand the literature in this trandisciplinary area but also to begin working to advance the field. The book will serve as an essential guide for scientists in either biology or engineering and for physicians who wish to gain expertise in these areas.

This book focuses on interdisciplinary research in the field of biomedical engineering and neuroscience. Biomedical engineering is a vast field, ranging from bioengineering to brain-computer interfaces. The book explores the system-level function and dysfunction of the nervous system from scientific and engineering perspectives. The initial sections introduce readers to the physiology of the brain, and to the biomedical tools needed for diagnostics and effective therapies for various neurodegenerative and regenerative disorders. In turn, the book summarizes the biomedical interventions that are used to understand the neural

mechanisms underlying empathy disorders, and reviews recent advances in biomedical engineering for rehabilitation in connection with neurodevelopmental disorders and brain injuries. Lastly, the book discusses innovations in machine learning and artificial intelligence for computer-aided disease diagnosis and treatment, as well as applications of nanotechnology in therapeutic neurology.

This book is a part of the Proceedings of the Seventh International Symposium on Neural Networks (ISNN 2010), held on June 6-9, 2010 in Shanghai, China. Over the past few years, ISNN has matured into a well-established premier international symposium on neural networks and related fields, with a successful sequence of ISNN series in Dalian (2004), Chongqing (2005), Chengdu (2006), Nanjing (2007), Beijing (2008), and Wuhan (2009). Following the tradition of ISNN series, ISNN 2010 provided a high-level international forum for scientists, engineers, and educators to present the state-of-the-art research in neural networks and related fields, and also discuss the major opportunities and challenges of future neural network research. Over the past decades, the neural network community has witnessed significant breakthroughs and developments from all aspects of neural network research, including theoretical foundations, architectures, and network organizations, modeling and simulation, empirical studies, as well as a wide range of applications across different domains. The recent developments of science and technology, including neuroscience, computer science, cognitive science, nano-technologies and engineering design, among others, has provided significant new understandings and technological solutions to move the neural network research toward the development of complex, large scale, and networked brain-like intelligent systems. This long-term goals can only be achieved with the continuous efforts from the community to seriously investigate various issues on neural networks and related topics.