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Neural Control of Speech The Cerebellum and Neural Control Neural Control Engineering Neural Control of Renal Function Neural Control Engineering Presynaptic Inhibition and Neural Control The Neural Control of Movement A First Course in Fuzzy and Neural Control Neural Control of Locomotion Neural Control of Movement Biomechanics and Neural Control of Posture and Movement Neural Control of the Respiratory Muscles Neural Regulation of Metabolism Behavior and Its Neural Control in Gastropod Molluscs Neural Control of the Pituitary Gland Neural Control of Circulation Peripheral and Spinal Mechanisms in the Neural Control of Movement Discrete-Time High Order Neural Control The Neural Control of Sleep and Waking The Neural Control of Behavior Neural Systems for Control The Muscle Spindle and Neural Control of the Tongue Neural Control of Space Coding and Action Production Information Storage and Neural Control Fuzzy-neural Control The Muscle Spindle and Neural Control of the Tongue The Muscle Spindle and Neural Control of the Tongue: Implications for Speech Discrete-Time Recurrent Neural Control Neural Control of Renewable Electrical Power Systems Neural Control of Gastrointestinal Function The Evolving Brain A First Course in Fuzzy and Neural Control The Respiratory Muscles: Mechanics and Neural Control Cardiovascular Physiology Neural Control Mechanisms Neural Control of Renal Function, Second Edition Muscles and Their Neural Control Information Storage and Neural Control Neural Control of Locomotion Solutions Manual First Course in Fuzzy And Neural Control Fuzzy and Neural Control

Illustrating how fuzzy logic and neural networks can be integrated into a model reference control context for real-time control of multivariable systems, this book provides an architecture which accommodates several popular learning/reasoning paradigms. In the last decade, we have witnessed a striking maturation of our understanding of how neurons in the spinal cord control muscular activity and movement. Paradoxically, a host of new findings have revealed an unexpected versatility in the behavior of these well-studied neural elements and circuits. In this volume, the world's leading experts review the current state of our knowledge of motor control, outline their latest results and developments, and delineate the seminal unresolved questions in this vibrant field of research. The volume begins with a commentary and overview of our current understanding of the peripheral and spinal basis of motor control. The remainder of the volume is divided into seven sections, each focused on a different problem. The first chapter in each section provides some historical review and presages the experimental findings and hypotheses that are discussed in subsequent chapters. Topics include the biomechanics of neuromuscular systems, the properties of motoneurons and the muscle units they control, spinal interneurons, pattern generating circuits, locomotion, descending control of spinal circuits, comparative physiology of motor systems, and motor systems neurophysiology studied in man. The book serves as a unique reference volume and should be essential reading for anyone interested in motor systems. Moreover, the volume's comprehensive coverage of a wide range of topics make it an effective textbook for graduate level courses in motor control neurobiology, kinesiology, physical therapy, and rehabilitation medicine. Presented with a choice of evils, most would prefer to be blinded rather than to be unable to move, immobilized in the late stages of Parkinson's disease. Yet in everyday life, as in Neuroscience, vision holds the centre of the stage. The conscious psyche watches a private TV show all day long, while the motor system is left to get on with it "out of sight and out of mind. " Motor skills are worshipped at all levels of society, whether in golf, tennis, soccer, athletics or in musical performance; meanwhile the subconscious machinery is ignored. But scientifically there is steady advance on a wide front, as we are reminded here, from the reversal of the reflexes of the stick insects to the site of motor learning in the human cerebral cortex. As in the rest of Physiology, evolution has preserved that which has already worked well; thus general principles can often be best discerned in lower animals. No one scientist can be personally involved at all levels of analysis, but especially for the motor system a narrow view is doomed from the outset. Interaction is all; the spinal cord has surrendered its autonomy to the brain, but the brain can only control the limbs by talking to the spinal cord in a language that it can understand, determined by its pre-existing circuitry; and both receive a continuous stream of feedback from the periphery. Neural networks have become a well-established methodology as exempli?ed by their applications to identi?cation and control of general nonlinear and complex systems; the use of high order neural networks for modeling and learning has recently increased. Usingneuralnetworks,controlalgorithmscanbedevelopedtoberobustto uncertainties and modeling errors. The most used NN structures are Feedf- ward networks and Recurrent networks. The latter type o?ers a better suited tool to model and control of nonlinear systems. There exist di?erent training algorithms for neural networks, which, h- ever, normally encounter some technical problems such as local minima, slow learning, and high sensitivity to initial conditions, among others. As a viable alternative, new training algorithms, for example, those based on Kalman ?ltering, have been proposed. There already exists publications about trajectory tracking using neural networks; however, most of those works were developed for continuous-time systems. On the other hand, while extensive literature is available for linear discrete-timecontrolsystem,nonlineardiscrete-timecontroldesigntechniques have not been discussed to the same degree. Besides, discrete-time neural networks are better ?tted for real-time implementations. This book presents a series of essays on neuroscientific aspects of human nature and instinctive behavior, individually acquired (learned) behavior, human bipedal locomotion, voluntary movement, and the general problem of how the brain controls behavior. The author argues that concepts of the mind based on ancient Greek philosophy are past usefulness, and that modern animal behavior studies provide a better guide to the functional organization of the brain. This is a timely review of the mechanisms underlying the presynaptic control of synaptic transmission and the role they play in sensory and motor behavior. Early chapters offer a detailed account of the anatomy, biophysics, and physiology of synaptic transmission at the peripheral and centralsynapses, focusing on the presynaptic control of transmitter release. Later chapters explore the organization of neural pathways leading to the presynaptic inhibition of transmitter release in segmental reflex pathways. A final section provides examples of the operation of presynaptic controlmechanisms during specific sensory and motor functions in mammals, including humans. Integrating synaptic transmission and CNS functions at the systems level, this volume will be of particular interest to researchers studying both areas. The gastrointestinal tract is a long, muscular tube responsible for the digestion of food, assimilation of nutrients and elimination of waste. This is achieved by secretion of digestive enzymes and absorption from the intestinal lumen, with different regions playing specific roles in the processing of specific nutrients. These regions come into play sequentially as ingested material is moved along the length of the GI tract by contractions of the muscle layers. In some regions like the oesophagus transit it rapid and measured in seconds while in others like the colon transit is measured in hours and even days, commensurate with the relative slow fermentation that takes place in the large bowel. An hierarchy of controls, neural and endocrine, serve to regulate the various cellular targets that exist in the gut wall. These include muscle cells for contraction and epithelial cells for secretion and absorption. However, there are complex interactions between these digestive mechanisms and other mechanisms that regulate blood flow, immune function, endocrine secretion and food intake. These ensure a fine balance between the ostensibly conflicting tasks of digestion and absorption and protection from potentially harmful ingested materials. They match assimilation of nutrients with hunger and satiety and they ensure that regions of the GI tract that are meters apart work together in a coordinated fashion to match these diverse functions to the digestive needs of the individual. This ebook will provide an overview of the neural mechanisms that control gastrointestinal function. Table of Contents: Neural Control of Gastrointestinal Function / Cells and Tissues / Enteric Nervous System / From Gut to CNS: Extrinsic Sensory Innervation / Sympathetic Innervation of the Gut / Parasympathetic Innervation of the Gut / Integration of Function / References During the past quarter century, there has been a tremendous expansion in our knowledge about gastropods, their behavior and their neurobiology. We can understand a great deal about mammalian nervous systems by studying the relatively larger and simpler structure of the gastropod nervous system. Behavior and Its Neural Control in Gastropod Molluscs first reviews the broader aspects of molluscan biology and draws attention to the special features of the gastropod nervous system. The book then examines different types of behavior, reviewing progress in understanding the mechanisms of neural control, and emphasizing cases in which control can be attributed to identified neurons and identified neural circuits. The Neural Control of Behavior contains some of the material presented and discussed at the first interdisciplinary conference on the neural control of behavior, held at the Department of Psychobiology of the University of California, Irvine in June 1968. The compendium presents papers prepared by scientists from a variety of disciplines, which touched upon the primary concerns of psychobiology. Main topics covered include neural mechanisms, evoked responses and network dynamics, perceptual mechanisms, and behavioral and cellular responses to novel and repeated stimuli. Hypothalamic mechanisms for motivational and species-typical behavior, learning and memory, and the behavior of hippocampal neurons during conditioning experiments are also discussed. Psychologists, neurologists, and psychobiologists will find the book very insightful. First published in 1997. The respiratory muscles are multifunctional muscles involved in other behaviors besides breathing -- from the protection of the upper airway to cognitive functions such as speech or singing. Neural Control of the Respiratory Muscles presents an overall consideration of how these muscles are regulated by the central nervous system in normal as well as in pathological situations. A group of 40 internationally recognized scientists and clinicians have collaborated to discuss current findings in the field and to identify areas of future development such as o The anatomical and functional organization of the respiratory muscles and the mechanics of the chest wall o Respiratory muscle control by the central nervous system during normal breathing and during disease states o Respiration during sleep, exercise, and locomotion o Respiratory muscle contribution to non-respiratory behaviors; interaction of the central pattern generator for respiration with other central pattern generators o Multifunctional nature of respiratory muscles and respiratory neurons of the central nervous system Although other texts exist that examine the control of breathing and other specialized topics considered in this volume, Neural Control of the Respiratory Muscles is the first major single-volume publication that takes a broad view of muscle control during non-respiratory behaviors and the coordination of respiration with non-respiratory behaviors. From speech to breathing to overt movement contractions of muscles are the only way other than sweating whereby we literally make a mark on the world. Locomotion is an essential part of this equation and exciting new developments are shedding light on the mechanisms underlying how this important behavior occurs. The Neural Control of Movement discusses these developments across a variety of species including man. The editors focus on highlighting the utility of different models from invertebrates to vertebrates. Each chapter discusses how new approaches in neuroscience are being used to dissect and control neural networks. An area of emphasis is on vertebrate motor networks and particularly the spinal cord. The spinal cord is unique because it has seen the use of genetic tools allowing the dissection of networks for over ten years. This book provides practical details on model systems, approaches, and analysis approaches related to movement control. This book is written for neuroscientists interested in movement control. Provides practice details on model systems, approaches, and analysis approaches related to movement control Discusses how recent advances like optogenetics and chemogenetics affect the need for model systems to be modified (or not) to work for studies of movement and motor control Written for neuroscientists interested in movement control, especially movement disorders like Parkinson’s, MS, spinal cord injury, and stroke A comprehensive and unified account of the neural computations underlying speech production, offering a theoretical framework bridging the behavioral and the neurological literatures. In this book, Frank Guenther offers a comprehensive, unified account of the neural computations underlying speech production, with an emphasis on speech motor control rather than linguistic content. Guenther focuses on the brain mechanisms responsible for commanding the musculature of the vocal tract to produce articulations that result in an acoustic signal conveying a desired string of syllables. Guenther provides neuroanatomical and neurophysiological descriptions of the primary brain structures involved in speech production, looking particularly at the cerebral cortex and its interactions with the cerebellum and basal ganglia, using basic concepts of control theory (accompanied by nontechnical explanations) to explore the computations performed by these brain regions. Guenther offers a detailed theoretical framework to account for a broad range of both behavioral and neurological data on the production of speech. He discusses such topics as the goals of the neural controller of speech; neural mechanisms involved in producing both short and long utterances; and disorders of the speech system, including apraxia of speech and stuttering. Offering a bridge between the neurological and behavioral literatures on speech production, the book will be a valuable resource for researchers in both fields. This book presents advanced control techniques that use neural networks to deal with grid disturbances in the context renewable energy sources, and to enhance low-voltage ride-through capacity, which is a vital in terms of ensuring that the integration of distributed energy resources into the electrical power network. It presents modern control algorithms based on neural identification for different renewable energy sources, such as wind power, which uses doubly-fed induction generators, solar power, and battery banks for storage. It then discusses the use of the proposed controllers to track doubly-fed induction generator dynamics references: DC voltage, grid power factor, and stator active and reactive power, and the use of simulations to validate their performance. Further, it addresses methods of testing low-voltage ride-through capacity enhancement in the presence of grid disturbances, as well as the experimental validation of the controllers under both normal and abnormal grid conditions. The book then describes how the proposed control schemes are extended to control a grid-connected microgrid, and the use of an IEEE 9-bus system to evaluate their performance and response in the presence of grid disturbances. Lastly, it examines the real-time simulation of the entire system under normal and abnormal conditions using an Opal-RT simulator. The kidney is innervated with efferent sympathetic nerve fibers reaching the renal vasculature, the tubules, the juxtaglomerular granular cells, and the renal pelvic wall. The renal sensory nerves are mainly found in the renal pelvic wall. Increases in efferent renal sympathetic nerve activity reduce renal blood flow and urinary sodium excretion by activation of 1-adrenoceptors and increase renin secretion rate by activation of 1-adrenoceptors. In response to normal physiological stimulation, changes in efferent renal sympathetic nerve activity contribute importantly to homeostatic regulation of sodium and water balance. The renal mechanosensory nerves are activated by stretch of the renal pelvic tissue produced by increases in renal pelvic tissue of a magnitude that may occur during increased urine flow rate. Activation of the sensory nerves elicits an inhibitory renorenal reflex response consisting of decreases in efferent renal sympathetic nerve activity leading to natriuresis. Increasing efferent sympathetic nerve activity increases afferent renal nerve activity which, in turn, decreases efferent renal sympathetic nerve activity by activation of the renorenal reflexes. Thus, activation of the afferent renal nerves buffers changes in efferent renal sympathetic nerve activity in the overall goal of maintaining sodium balance. In pathological conditions of sodium retention, impairment of the inhibitory renorenal reflexes contributes to an inappropriately increased efferent renal sympathetic nerve activity in the presence of sodium retention. In states of renal disease or injury, there is a shift from inhibitory to excitatory reflexes originating in the kidney. Studies in essential hypertensive patients have shown that renal denervation results in long-term reduction in arterial pressure, suggesting an important role for the efferent and afferent renal nerves in hypertension. Table of Contents: Part I: Efferent Renal Sympathetic Nerves / Introduction / Neuroanatomy / Neural Control of Renal Hemodynamics / Neural Control of Renal Tubular Function / Neural Control of Renin Secretion Rate / Part II: Afferent Renal Sensory Nerves / Introduction / Neuroanatomy / Renorenal Reflexes / Mechanisms Involved in the Activation of Afferent Renal Sensory Nerves / Part III: Pathophysiological States / Efferent Renal Sympathetic Nerves / Afferent Renal Sensory Nerves / Conclusions / References" This book systemically describes the mechanisms underlying the neural regulation of metabolism. Metabolic diseases, including obesity and its associated conditions, currently affect more than 500 million people worldwide. Recent research has shown that the neural regulation of metabolism is a central mechanism that controls metabolic status physiologically and pathophysiologically. The book first introduces the latest studies on the neural and cellular mechanisms of hypothalamic neurons, hypothalamic glial cells, neural circuitries, cellular signaling pathways, and synaptic plasticity in the control of appetite, body weight, feeding-related behaviors and metabolic disorders. It then summarizes the humoral mechanisms by which critical adipocyte-derived hormones and lipoprotein lipase regulate lipid and glucose metabolism, and examines the role of the hypothalamus-sympathetic nerve, a critical nerve pathway from CNS to peripheral nervous system (PNS), in the regulation of metabolism in multiple tissues/organs. Furthermore, the book discusses the functions of adipose tissue in energy metabolism. Lastly, it explores dietary interventions to treat neural diseases and some of the emerging technologies used to study the neural regulation of metabolism. Presenting cutting-edge developments in the neural regulation of metabolism, the book is a valuable reference resource for graduate students and researchers in the field of neuroscience and metabolism. Although the use of fuzzy control methods has grown nearly to the level of classical control, the true understanding of fuzzy control lags seriously behind. Moreover, most engineers are well versed in either traditional control or in fuzzy control-rarely both. Each has applications for which it is better suited, but without a good understanding of both, engineers cannot make a sound determination of which technique to use for a given situation. A First Course in Fuzzy and Neural Control is designed to build the foundation needed to make those decisions. It begins with an introduction to standard control theory, then makes a smooth transition to complex problems that require innovative fuzzy, neural, and fuzzy-neural techniques. For each method, the authors clearly answer the questions: What is this new control method? Why is it needed? How is it implemented? Real-world examples, exercises, and ideas for student projects reinforce the concepts presented. Developed from lecture notes for a highly successful course titled The Fundamentals of Soft Computing, the text is written in the same reader-friendly style as the authors' popular A First Course in Fuzzy Logic text. A First Course in Fuzzy and Neural Control requires only a basic background in mathematics and engineering and does not overwhelm students with unnecessary material but serves to motivate them toward more advanced studies. 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. Neural Control of Circulation presents an in-depth view of specialized areas in the neural regulation of the circulatory system that have been the subject of intensive research, the historical basis and theory from which those investigations evolved, and directions for future studies. Special emphasis is placed on critical evaluation of the experimental data in each field of research. This volume is comprised of seven chapters and begins with a synthesis of a large number of studies undertaken using conscious animals, particularly those that focuses on the behavioral and cerebral control of cardiovascular function. The second chapter explores the role of the brain stem and cerebellum in cardiovascular control. Next, specific research areas concerning bulbospinal control of sympathetic nerve discharge are discussed. This is followed by a chapter devoted to the nucleus tractus solitarii and experimental neurogenic hypertension. A concept in potential hypertensive mechanisms involving long-term transsynaptic regulation of adrenal medullary function is also described, and the neural control of the circulation during hypoxia is considered. Finally, aspects of central nervous system pharmacology and regulation of circulation are examined. This book is designed for individuals who are interested in the cardiovascular system and its function, and should also prove useful to students and researchers in physiology and individuals in other ancillary areas of bioscience. Clinical neuropsychology has evolved by integrating in its field the knowledge derived from neuroanatomical, electrophysiological and psychophysical data, and has led to the development of rehabilitation tools. This volume tries to link the new concepts and discoveries in the field of sensorimotor coordination. It contains the main contributions of participants of an international symposium held in Lyon in 2001 entitled "Neural control of space coding and action production". The book emphasizes the reciprocal relationship between perception and action, and the essential role of active sensorimotor organization or reorganization in building up perceptual and motor representations of the self and of the external world. Although the use of fuzzy control methods has grown nearly to the level of classical control, the true understanding of fuzzy control lags seriously behind. Moreover, most engineers are well versed in either traditional control or in fuzzy control-rarely both. Each has applications for which it is better suited, but without a good understanding of both, engineers cannot make a sound determination of which technique to use for a given situation. A First Course in Fuzzy and Neural Control is designed to build the foundation needed to make those decisions. 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Under normal conditions, the renal mechanosensory nerves activated by stretch of the sensory nerves elicits an inhibitory renorenal reflex response consisting of decreases in efferent renal sympathetic nerve activity leading to natriuresis. Increasing efferent sympathetic nerve activity increases afferent renal nerve activity which, in turn, decreases efferent renal sympathetic nerve activity by activation of the renorenal reflexes. Thus, activation of the afferent renal nerves buffers changes in efferent renal sympathetic nerve activity in the overall goal of maintaining sodium balance. In pathological conditions of sodium retention, impairment of the inhibitory renorenal reflexes contributes to an inappropriately increased efferent renal sympathetic nerve activity in the presence of sodium retention. In states of renal disease or injury, there is a shift from inhibitory to excitatory reflexes originating in the kidney. Studies in essential hypertensive patients have shown that renal denervation results in long-term reduction in arterial pressure, suggesting an important role for the efferent and afferent renal nerves in hypertension. Control problems offer an industrially important application and a guide to understanding control systems for those working in Neural Networks. Neural Systems for Control represents the most up-to-date developments in the rapidly growing aplication area of neural networks and focuses on research in natural and artifical neural systems directly applicable to control or making use of modern control theory. The book covers such important new developments in control systems such as intelligent sensors in semiconductor wafer manufacturing; the relation between muscles and cerebral neurons in speech recognition; online compensation of reconfigurable control for spacecraft aircraft and other systems; applications to rolling mills, robotics and process control; the usage of past output data to identify nonlinear systems by neural networks; neural approximate optimal control; model-free nonlinear control; and neural control based on a regulation of physiological investigation/blood pressure control. All researchers and students dealing with control systems will find the fascinating Neural Systems for Control of immense interest and assistance. Focuses on research in natural and artifical neural systems directly applicable to contol or making use of modern control theory Represents the most up-to-date developments in this rapidly growing application area of neural networks Takes a new and novel approach to system identification and synthesis My first contact with “the other” Jerome Siegel came in 1973, when I moved to Los Angeles to do postdoctoral work at UCLA. My thesis work had been listed in a nationally available posting without any address. The Brain Inf- mation Service, thinking they knew where I was, listed “the other” Jerome Siegel’s Delaware address for reprint requests. I soon received a letter from Jerry along with the requests he had received and we have remained in c- tact ever since. I am occasionally reminded of my namesake when I meet a new colleague who is impressed that someone “so young” published a paper in Science in 1965 (one year out of high school, if it had been me). I entered the field in the early 1970s just as he left. My interests in REM sleep and brainstem mechanisms have been eerily similar to his (and he also did po- doctoral work at UCLA), so our research contributions can be distinguished easily only by my use of my middle initial (which has occasionally been om- ted from my publications). So, my namesake and I both have an interest in seeing to it that no one “brings shame to the name. ” The current work certainly fulfills that dictum. This is a very unusual book, both in its scope and in its approach to the - terial. Cardiovascular Physiology Neural Control Mechanisms contains the proceedings of the symposia of the 28th International Congress of Physiology held in Budapest between 13 and 19 of July, 1980. Organized into six parts, this book begins with an elucidation of the integrative role of the autonomic nervous system in the regulation of cardiovascular function. Parts II and III explain neural reflex control of the heart and cerebral blood flow regulation. Nervous control of the microcirculation and control of vascular capacitance in man and animals are then discussed. The last part focuses on the reflex control of the circulation in man. Neurologie, Muskel, Muskelphysiologie. Most routine motor tasks are complex, involving load transmission through out the body, intricate balance, and eye-head-shoulder-hand-torso-leg coor dination. The quest toward understanding how we perform such tasks with skill and grace, often in the presence of unpredictable perturbations, has a long history. This book arose from the Ninth Engineering Foundation Con ference on Biomechanics and Neural Control of Movement, held in Deer Creek, Ohio, in June 1996. This unique conference, which has met every 2 to 4 years since the late 1960s, is well known for its informal format that promotes high-level, up-to-date discussions on the key issues in the field. The intent is to capture the high quality ofthe knowledge and discourse that is an integral part of this conference series. The book is organized into ten sections. Section I provides a brief intro duction to the terminology and conceptual foundations of the field of move ment science; it is intended primarily for students. All but two of the re maining nine sections share a common format: (l) a designated section editor; (2) an introductory didactic chapter, solicited from recognized lead ers; and (3) three to six state-of-the-art perspective chapters. Some per spective chapters are followed by commentaries by selected experts that provide balance and insight. Section VI is the largest section, and it con sists of nine perspective chapters without commentaries. The book presents recent advances in the theory of neural control for discrete-time nonlinear systems with multiple inputs and multiple outputs. The simulation results that appear in each chapter include rigorous mathematical analyses, based on the Lyapunov approach, to establish its properties. The book contains two sections: the first focuses on the analyses of control techniques; the second is dedicated to illustrating results of real-time applications. It also provides solutions for the output trajectory tracking problem of unknown nonlinear systems based on sliding modes and inverse optimal control scheme. "This book on Discrete-time Recurrent Neural Control is unique in the literature, with new knowledge and information about the new technique of recurrent neural control especially for discrete-time systems. The book is well organized and clearly presented. It will be welcome by a wide range of researchers in science and engineering, especially graduate students and junior researchers who want to learn the new notion of recurrent neural control. I believe it will have a good market. It is an excellent book after all." — Guanrong Chen, City University of Hong Kong "This book includes very relevant topics, about neural control. In these days, Artificial Neural Networks have been recovering their relevance and well-stablished importance, this due to its great capacity to process big amounts of data. Artificial Neural Networks development always is related to technological advancements; therefore, it is not a surprise that now we are being witnesses of this new era in Artificial Neural Networks, however most of the developments in this research area only focuses on applicability of the proposed schemes. However, Edgar N. Sanchez author of this book does not lose focus and include both important applications as well as a deep theoretical analysis of Artificial Neural Networks to control discrete-time nonlinear systems. It is important to remark that first, the considered Artificial Neural Networks are development in discrete-time this simplify its implementation in real-time; secondly, the proposed applications ranging from modelling of unknown discrete-time on linear systems to control electrical machines with an emphasize to renewable energy systems. However, its applications are not limited to these kind of systems, due to their theoretical foundation it can be applicable to a large class of nonlinear systems. All of these is supported by the solid research done by the author." — Alma Y. Alanis, University of Guadalajara, Mexico "This book discusses in detail; how neural networks can be used for optimal as well as robust control design. Design of neural network controllers for real time applications such as induction motors, boost converters, inverted pendulum and doubly fed induction generators has also been carried out which gives the book an edge over other similar titles. This book will be an asset for the novice to the experienced ones." — Rajesh Joseph Abraham, Indian Institute of Space Science & Technology, Thiruvananthapuram, India 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. 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welcoming here.

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