

Biomedical Engineering Prosthetic Limbs

Introduction to Biomechatronics is a text reference that provides biomedical engineering students and professionals with the fundamental mechatronic (mechanics, electronics, robotics) engineering knowledge they need to analyze and design devices that improve lives.

Therapeutic Engineering (TE) is a cutting-edge domain in today's era of medical technology research. Through engineering algorithms that provide technological solutions, it aims to elevate the quality of life of disabled individuals. Advances in Therapeutic Engineering describes various therapeutic processes and mechanisms currently applied to the field of healthcare in a range of areas, including mobility, communications, hearing, vision, and mental health and cognition. The book explores research and advances in the areas of hand-eye coordination, motor function, the biomechanics of lower limbs, and treatment of spinal diseases and neural plasticity. It discusses electrical stimulation methodologies for improving human gait. It also examines prosthetic devices and assistive technology, induction heater-based treatment, and inclusive user modelling and simulation. Additional chapters cover automated asthma detection using clinico-spirometric information, computer-aided diagnostic modules for malaria screening, and various data mining techniques that have been developed and successfully implemented in healthcare management. The contributors also examine semantic interoperability issues in e-health systems and clinical decision support systems (CDSSs) Ranging from prosthetics to sensory substitution and medical robotics, the book will prove enlightening to researchers and practitioners in a host of disciplines who want to understand the recent advances achieved globally in the field of therapeutic engineering.

Biomechatronics is rapidly becoming one of the most influential and innovative research directions defining the 21st century. Biomechatronics will provide a complete and up-to-date account of this advanced subject at the university textbook level. Each chapter in this book will be co-authored by top industry experts in the corresponding subfield, and will be led by Professor Marko B. Popovic, researcher and educator at the forefront of advances in the biomechatronics field. Beginning with an introduction to the field and its historical background, this book will delve into the most groundbreaking and recent developments in biomechatronics, such as artificial organs and tissues, prosthetic limbs, orthotic systems, wearable systems for physical augmentation, physical therapy and rehabilitation, robotic surgery, and natural and synthetic sensors. The only biomechatronics textbook written especially for students at a university level Ideal for undergraduate and graduate students and researchers in the biomechatronics, biomechanics, robotics, and biomedical engineering fields Provides an overview of state-of-the-art science and technology of modern day

biomechatronics, introduced by the leading experts in this fascinating field

This volume presents the proceedings of the Fifth International Conference on the Development of Biomedical Engineering in Vietnam which was held from June 16-18, 2014 in Ho Chi Minh City. The volume reflects the progress of Biomedical Engineering and discusses problems and solutions. It aims at identifying new challenges, and shaping future directions for research in biomedical engineering fields including medical instrumentation, bioinformatics, biomechanics, medical imaging, drug delivery therapy, regenerative medicine and entrepreneurship in medical devices.

Since publication in 1999, the first edition of Introduction to Biomedical Engineering has dominated the market of biomedical engineering texts. Under the direction of John Enderle, Susan Blanchard and Joe Bronzino, leaders in the field have contributed chapters on the most relevant subjects for biomedical engineering students. These chapters coincide with courses offered in all biomedical engineering programs so that it can be used at different levels for a variety of courses of this evolving field. Both Enderle and Blanchard are on the Accreditation Board for Engineering and Technology (ABET), the body that sets the standard for US-based engineering programs. These standards have been used as a guideline for examples and pedagogy. New to this edition: Computational Biology, Medical Imaging, Genomics and Bioinformatics. · 60% update from first edition to reflect the developing field of biomedical engineering. · Pioneer title in the Academic Press Series in Biomedical Engineering · Over 4,000 units of first edition sold · MatLab examples included in every chapter

Can technology and innovation transform world health? Connecting undergraduate students with global problems, Rebecca Richards-Kortum examines the interplay between biomedical technology design and the medical, regulatory, economic, social and ethical issues surrounding global health. Driven by case studies, including cancer screening, imaging technologies, implantable devices and vaccines, students learn how the complexities and variation across the globe affect the design of devices and therapies. A wealth of learning features, including classroom activities, project assignments, homework problems and weblinks within the book and online, provide a full teaching package. For visionary general science and biomedical engineering courses, this book will inspire students to engage in solving global issues that face us all.

A State-of-the-Art Guide to Biomedical Engineering and Design Fundamentals and Applications The two-volume Biomedical Engineering and Design Handbook, Second Edition offers unsurpassed coverage of the entire biomedical engineering field, including fundamental concepts, design and development processes, and applications. This landmark work contains contributions on a wide range of topics from nearly 80 leading experts at universities, medical centers, and commercial and law firms. Volume 1 focuses on the basics of biomedical engineering, including biomedical systems

analysis, biomechanics of the human body, biomaterials, and bioelectronics. Filled with more than 500 detailed illustrations, this superb volume provides the foundational knowledge required to understand the design and development of innovative devices, techniques, and treatments. Volume 2 provides timely information on breakthrough developments in medical device design, diagnostic equipment design, surgery, rehabilitation engineering, prosthetics design, and clinical engineering. Filled with more than 400 detailed illustrations, this definitive volume examines cutting-edge design and development methods for innovative devices, techniques, and treatments. Volume 1 covers: Modeling and Simulation of Biomedical Systems Bioheat Transfer Physical and Flow Properties of Blood Respiratory Mechanics and Gas Exchange Biomechanics of the Respiratory Muscles Biomechanics of Human Movement Biomechanics of the Musculoskeletal System Biodynamics Bone Mechanics Finite Element Analysis Vibration, Mechanical Shock, and Impact Electromyography Biopolymers Biomedical Composites Bioceramics Cardiovascular Biomaterials Dental Materials Orthopaedic Biomaterials Biomaterials to Promote Tissue Regeneration Bioelectricity Biomedical Signal Analysis Biomedical Signal Processing Intelligent Systems and Bioengineering BioMEMS Volume 2 covers: Medical Product Design FDA Medical Device Requirements Cardiovascular Devices Design of Respiratory Devices Design of Artificial Kidneys Design of Controlled-Release Drug Delivery Systems Sterile Medical Device Package Development Design of Magnetic Resonance Systems Instrumentation Design for Ultrasonic Imaging The Principles of X-Ray Computed Tomography Nuclear Medicine Imaging Instrumentation Breast Imaging Systems Surgical Simulation Technologies Computer-Integrated Surgery and Medical Robotics Technology and Disabilities Applied Universal Design Design of Artificial Arms and Hands for Prosthetic Applications Design of Artificial Limbs for Lower Extremity Amputees Wear of Total Knee and Hip Joint Replacements Home Modification Design Intelligent Assistive Technology Rehabilitators Risk Management in Healthcare Technology Planning for Healthcare Institutions Healthcare Facilities Planning Healthcare Systems Engineering Enclosed Habitat Life Support

Significant progress has been made in the development of neural prostheses for restoration of human functions and improvement of the quality of life. Biomedical engineers and neuroscientists around the world are working to improve the design and performance of existing devices and to develop novel devices for artificial vision, artificial limbs, and brain-machine interfaces. This book, *Implantable Neural Prostheses 2: Techniques and Engineering Approaches*, is part two of a two-volume sequence that describes state-of-the-art advances in techniques associated with implantable neural prosthetic devices. The techniques covered include biocompatibility and biostability, hermetic packaging, electrochemical techniques for neural stimulation applications, novel electrode materials and testing, thin-film flexible microelectrode arrays, in situ characterization of microelectrode arrays, chip-size thin-film device encapsulation, microchip-embedded capacitors and microelectronics for recording, stimulation, and wireless telemetry. The design process in the development of medical devices is also discussed. Advances in biomedical engineering, microfabrication technology, and neuroscience have led to improved medical-device

designs and novel functions. However, many challenges remain. This book focuses on the engineering approaches, R&D advances, and technical challenges of medical implants from an engineering perspective. We are grateful to leading researchers from academic institutes, national laboratories, as well as design engineers and professionals from the medical device industry who have contributed to the book. Part one of this series covers designs of implantable neural prosthetic devices and their clinical applications.

Targeted Muscle Reinnervation
A Neural Interface for Artificial Limbs
Taylor & Francis

Did you know that a scientist discovered X-rays by accident? Or that people have been taking pain medicine for more than 5,000 years? Get ready to learn the strange stories behind inventions you use every day. From the Roman warrior with a famous false hand to the Boy Scouts who made Band-Aids a big deal, you'll find out how we got the medical wonders that help us heal faster and feel better.

It is with great pleasure that we present to you a collection of over 200 high quality technical papers from more than 10 countries that were presented at the Biomed 2008. The papers cover almost every aspect of Biomedical Engineering, from artificial intelligence to biomechanics, from medical informatics to tissue engineering. They also come from almost all parts of the globe, from America to Europe, from the Middle East to the Asia-Pacific. This set of papers presents to you the current research work being carried out in various disciplines of Biomedical Engineering, including new and innovative researches in emerging areas. As the organizers of Biomed 2008, we are very proud to be able to come-up with this publication. We owe the success to many individuals who worked very hard to achieve this: members of the Technical Committee, the Editors, and the International Advisory Committee. We would like to take this opportunity to record our thanks and appreciation to each and every one of them. We are pretty sure that you will find many of the papers illuminating and useful for your own research and study. We hope that you will enjoy yourselves going through them as much as we had enjoyed compiling them into the proceedings. Assoc.

Prof. Dr. Noor Azuan Abu Osman Chairperson, Organising Committee, Biomed 2008

The 33rd volume of the Journal of Biomimetics, Biomaterials and Biomedical Engineering includes papers that describe the results of scientific research of some applied aspects in the fields of the human biomechanics, processing methods of the biomedical signals and images, utilization of modern biomaterials and methods in current biomedical practice. We hope that this volume will be useful for many researchers and engineers involved in different branches of biomedicine and engineering sciences.

This book focuses on advances made in both materials science and scaffold development techniques, paying close attention to the latest and state-of-the-art research. Chapters delve into a sweeping variety of specific materials categories, from composite materials to bioactive ceramics, exploring how these materials are specifically designed for regenerative engineering applications. Also included are unique chapters on biologically-derived scaffolding, along with 3D printing technology for regenerative engineering. Features: Covers the latest developments in advanced materials for regenerative engineering and medicine. Each chapter is written by world class researchers in various aspects of this medical technology. Provides unique coverage of biologically derived scaffolding. Includes separate chapter on how 3D printing technology is related to regenerative engineering. Includes extensive references at the end of each chapter to enhance further study.

THE HANDBOOK THAT BRIDGES THE GAP BETWEEN ENGINEERING PRINCIPLES AND BIOLOGICAL SYSTEMS The focus in the "Standard Handbook of Biomedical Engineering and Design" is on engineering design informed by description and analysis using engineering language and methodology. Over 40 experts from universities and medical centers throughout North America, the United Kingdom, and Israel have produced a practical reference for the biomedical professional who is seeking to solve a wide range of engineering and design problems, whether to enhance a diagnostic or therapeutic technique, reduce the cost of manufacturing a medical instrument or a prosthetic

device, improve the daily life of a patient with a disability, or increase the effectiveness of a hospital department. Heavily illustrated with tables, charts, diagrams, and photographs, most of them original, and filled with equations and useful references, this handbook speaks directly to all practitioners involved in biomedical engineering, whatever their training and areas of specialization. Coverage includes not only fundamental principles, but also numerous recent advances in this fast moving discipline. Major sections include: * Biomedical Systems Analysis * Mechanics of the Human Body * Biomaterials * Bioelectricity * Design of Medical Devices and Diagnostic Instrumentation * Engineering Aspects of Surgery * Rehabilitation Engineering * Clinical Engineering The "Handbook" offers breadth and depth of biomedical engineering design coverage unmatched in any other general reference.

Significant progress has been made in the development of neural prostheses to restore human functions and improve the quality of human life. Biomedical engineers and neuroscientists around the world are working to improve design and performance of existing devices and to develop novel devices for artificial vision, artificial limbs, and brain-machine interfaces. This book, *Implantable Neural Prostheses 1: Devices and Applications*, is part one of a two-book series and describes state-of-the-art advances in techniques associated with implantable neural prosthetic devices and their applications. Devices covered include sensory prosthetic devices, such as visual implants, cochlear implants, auditory midbrain implants, and spinal cord stimulators. Motor prosthetic devices, such as deep brain stimulators, Bion microstimulators, the brain control and sensing interface, and cardiac electro-stimulation devices are also included. Progress in magnetic stimulation that may offer a non-invasive approach to prosthetic devices is introduced. Regulatory approval of implantable medical devices in the United States and Europe is also discussed.

This book aims to provide a brief update to the current status of and advances in computational methods and programs used for the development of the theory and practice of biomedical signal and image communication. The book comprises a collection of invited manuscripts, written in a convenient way and of manageable length. These timely collections will provide an invaluable resource for initial inquiries into technologies and will encapsulate the latest developments and applications with reference sources for further detailed information. The methods described in this book cover a wide range of computational algorithms that are widely used in bioengineering and biomedicine. The content and format are specifically designed to stimulate the further development and application of these technologies by reaching out to non-specialists across a broad audience. This book is intended to expose the latest developments of scientists and engineers covering a variety of complementary topics, to enhance people's overall understanding of computer science and biomedical image communications. It will benefit students, scientists, and researchers in applied computer science. Engineers and clinicians working in imaging will also find this book useful.

This book covers recent advances in bioengineering that have changed both the world in which we live and the bodies within which we live. Among the topics covered are homeostasis, biological and artificial control systems, diagnostic

imaging, prostheses, biomaterials, environmental engineering, and various subfields of bioengineering.

This book aims to provide state-of-the-art information on computer architecture and simulation in industry, engineering, and clinical scenarios. Accepted submissions are high in scientific value and provide a significant contribution to computer architecture. Each submission expands upon novel and innovative research where the methods, analysis, and conclusions are robust and of the highest standard. This book is a valuable resource for researchers, students, non-governmental organizations, and key decision-makers involved in earthquake disaster management systems at the national, regional, and local levels.

An integrated survey of best practices for the management of patients with implanted prosthetic devices and an insightful examination of the epidemiological, societal, and policy issues associated with their use. The devices covered range from breast, penile, vascular, and joint prostheses to cochlear, ossicular, and dental implants, and include cerebrospinal fluid shunts, cardiac valves, stents, and pacemakers. For each device, the authors consider its pros and cons, detail the best current strategies to keep implanted patients healthy, and evaluate the latest and most promising new diagnostic tests. Clinical counterpoints from distinguished authorities at major centers in the United States and Europe are offered throughout. Follow-up recommendations are summarized in a standardized format that allows comparative analysis and lays the foundation for controlled clinical trials and the eventual establishment of evidence-based guidelines.

Curious about the major players in the Wearable Robotics industry? Interested in learning what types of products the industry produces? Look no further – this report includes 79 companies and universities to give the reader a clear feel for the industry and where it is heading, from exoskeletons to prosthetic and bionic limbs to cyborgs. As of 2016, Wearable Robotics is still a relatively new field and comprehensive lists of companies are hard to come by, so spend your time utilizing this report instead of scouring the internet for days. Enjoy! **WHY BUY THIS REPORT?** Researching companies takes time; in fact it takes hours and days. So why should you have to spend hours searching the internet for these companies when I've already done it? Your time is valuable. At an engineer's wage (let's say \$36/hr), you would spend \$288 for one 8-hour day of searching. That's a lot to pay for information that already exists. So instead, why not get a great list right here for a fraction of the cost?

This is an updated and abridged edition of the original volume published in 2004. Like its predecessor it is targeted for students of bioengineering, biomedical engineering, applied physiology, biological cybernetics and related fields; for engineers and scientists who have an interest in neuroprosthetics; and for medical practitioners using products of that field. The practice of neuroprosthetics requires a fundamental understanding of the anatomy and physiology of the nervous system, mathematical neurobiology, material science, electrochemistry, and electrophysiology. The text

assumes some familiarity with basic anatomy, physiology, calculus, electrophysiology and bioinstrumentation, which typically are covered in undergraduate and first year graduate bioengineering curricula. These areas are also reviewed here, with the aim of consolidating principles fundamental to understanding the field. With that as background, the book then presents an overview of the field with detailed emphasis in selected areas of neural interfaces and neuroprostheses. The covered topics provide readers with sufficient information to understand the theory, rationale, design, and functioning of neuroprosthetic devices currently in clinical use and under development. The current volume is shorter than its predecessor. This has been achieved by reducing some of the repetition present in certain chapters of the earlier edition and eliminating a few chapters whose topics are now well covered in review literature readily available on the internet and elsewhere. Two chapters have been retained in their original versions to provide important background material, but the remaining chapters have either been revised by their original authors or replaced by new versions written by different authors. In addition new topics have been added to the section on existing systems.

The updated edition of this popular textbook offers an overview of the major components of the field, including signal processing in bio-systems, biomechanics, and biomaterials. Introducing capstone design and entrepreneurship, the second edition examines basic engineering, anatomy, and physiology concepts to facilitate an in-depth and up

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As in many other fields, biomedical engineers benefit from the use of computational intelligence (CI) tools to solve complex and non-linear problems. The benefits could be even greater if there were scientific literature that specifically focused on the biomedical applications of computational intelligence techniques. The first comprehensive field-specific reference, *Computational Intelligence in Biomedical Engineering* provides a unique look at how techniques in CI can offer solutions in modelling, relationship pattern recognition, clustering, and other problems particular to the field. The authors begin with an overview of signal processing and machine learning approaches and continue on to introduce specific applications, which illustrate CI's importance in medical diagnosis and healthcare. They provide an extensive review of signal processing techniques commonly employed in the analysis of biomedical signals and in the improvement of signal to noise ratio. The text covers recent CI techniques for post processing ECG signals in the diagnosis of cardiovascular disease and as well as various studies with a particular focus on CI's potential as a tool for gait diagnostics. In addition to its detailed accounts of the most recent research, *Computational Intelligence in Biomedical Engineering* provides useful applications and information on the benefits of applying computation intelligence techniques to improve medical diagnostics.

This textbook provides a thorough introduction and overview of the design and engineering of state-of-the-art prosthetics and assistive technologies. Innovations in prosthetics are increasingly made by cross-disciplinary thinking, and the author introduces the application of biomedical, mechanical, electrical, computer, and materials engineering principles to the design of artificial limbs. Coverage includes the fundamentals of biomechanics, biomechanical modeling and measurements, the basics of anatomy and physiology of limb defects, and the historical development of prosthetic design. This book stimulates the innovative thinking necessary for advancing limb restoration, and will be essential reading for students, as well as researchers, professional engineers, and prosthetists involved in the design and manufacture of artificial limbs. Learning enhanced by the exercises, including physical modeling with MATLAB and Simulink; Includes appendices with relevant equations and parameters for reference; Introduction to the design and engineering of prosthetics and assistive technologies.

This volume presents the proceedings of the CLAIB 2016, held in Bucaramanga, Santander, Colombia, 26, 27 & 28 October 2016. The proceedings, presented by the Regional Council of Biomedical Engineering for Latin America (CORAL), offer research findings, experiences and activities between institutions and universities to develop Bioengineering, Biomedical Engineering and related sciences. The conferences of the American Congress of Biomedical Engineering are sponsored by the International Federation for Medical and Biological Engineering (IFMBE), Society for Engineering in Biology and Medicine (EMBS) and the Pan American Health Organization (PAHO), among other organizations and international agencies to bring together scientists, academics and biomedical engineers in Latin America and other continents in an environment conducive to exchange and professional growth.

This book illustrates the significance of biomedical engineering in modern healthcare systems. Biomedical engineering plays an important role in a range of areas, from diagnosis and analysis to treatment and recovery and has entered the public

consciousness through the proliferation of implantable medical devices, such as pacemakers and artificial hips, as well as the more futuristic technologies such as stem cell engineering and 3-D printing of biological organs. Starting with an introduction to biomedical engineering, the book then discusses various tools and techniques for medical diagnostics and treatment and recent advances. It also provides comprehensive and integrated information on rehabilitation engineering, including the design of artificial body parts, and the underlying principles, and standards. It also presents a conceptual framework to clarify the relationship between ethical policies in medical practice and philosophical moral reasoning. Lastly, the book highlights a number of challenges associated with modern healthcare technologies.

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

Encyclopedia of Biomedical Engineering is a unique source for rapidly evolving updates on topics that are at the interface of the biological sciences and engineering. Biomaterials, biomedical devices and techniques play a significant role in improving the quality of health care in the developed world. The book covers an extensive range of topics related to biomedical engineering, including biomaterials, sensors, medical devices, imaging modalities and imaging processing. In addition, applications of biomedical engineering, advances in cardiology, drug delivery, gene therapy, orthopedics, ophthalmology, sensing and tissue engineering are explored. This important reference work serves many groups working at the interface of the biological sciences and engineering, including engineering students, biological science students, clinicians, and industrial researchers. Provides students with a concise description of the technologies at the interface of the biological sciences and engineering Covers all aspects of biomedical engineering, also incorporating perspectives from experts working within the domains of biomedicine, medical engineering, biology, chemistry, physics, electrical engineering, and more Contains reputable, multidisciplinary content from domain experts Presents a 'one-stop' resource for access to information written by world-leading scholars in the field A study of neuroprosthetics. It is broadly divided into three sections which address: neuroanatomy and neurophysiology, biomaterials and biocompatibility, stimulation and recording techniques; clinical applications of neuroprosthetics; and future developments.

Over the last century, medicine has come out of the black bag and emerged as one of the most dynamic and advanced fields of development in science and technology. Today, biomedical engineering plays a critical role in patient diagnosis, care, and rehabilitation. As such, the field encompasses a wide range of disciplines, from biology and physiolog

Thinking Like an Engineer focuses on high-interest, career-related topics in the elementary curriculum related to engineering. Students will explore interdisciplinary content, foster creativity, and develop higher order thinking skills with activities aligned to relevant content area standards. Students will complete design challenges, visit with an engineer, and investigate real-world problems to plan feasible engineering solutions. Thinking Like an Engineer reflects key emphases of curricula from the Center for Gifted Education at William & Mary, including the development of process skills in various content areas and the enhancement of discipline-specific thinking and habits of mind through hands-on activities. Grade 4

The 2006 conference, "Smart Prosthetics: Exploring Assistive Devices for the Body and Mind," attracted scientists, engineers and medical researchers to participate in a series of task groups to develop research plans to address various challenges within the prosthetics field. Eleven conference task groups gave the participants eight hours to develop new research approaches to various challenges, including: build a smart prosthesis that will grow with a child; develop a smart prosthetic that can learn better and/or faster; refine technologies to create active orthotic devices; and describe a framework for replacing damaged cortical tissue and fostering circuit integration to restore neurological function. Representatives from public and private funding organizations, government, industry, and the science media also participated in the task groups. This book provides a summary of the conference task groups. For more information about the conference, visit the Smart Prosthetics conference site. The National Academies Keck Futures Initiative was launched in 2003 to stimulate new modes of scientific inquiry and break down the conceptual and institutional barriers to interdisciplinary research. The National Academies and the W.M. Keck Foundation believe considerable scientific progress and social benefit will be achieved by providing a counterbalance to the tendency to isolate research within academic fields. The Futures Initiative is designed to enable researchers from different disciplines to focus on new questions upon which they can base entirely new research, and to encourage better communication between scientists as well as between the scientific community and the public. Funded by a \$40 million grant from the W.M. Keck Foundation, the National Academies Keck Futures Initiative is a 15-year effort to catalyze interdisciplinary inquiry and to enhance communication among researchers, funding agencies, universities, and the general public with the object of stimulating interdisciplinary research at the most exciting frontiers. The Futures Initiative builds on three pillars of vital and sustained research: interdisciplinary encounters that counterbalance specialization and isolation; the identification and exploration of new research topics; and communication that bridges languages, cultures, habits of thought, and institutions. Toward these goals, the National Academies Keck Futures Initiative incorporates three core activities each year: Futures conferences, Futures grants, and National Academies Communication Awards. For more information about the Initiative, visit www.keckfutures.org.

Engineers design our modern world. They combine science and technology to create incredible vehicles, structures, and objects. This title examines amazing feats of biological engineering. Engaging text explores bionic legs, artificial organs, and animal cloning. It also examines the engineers who made these projects a reality and traces the history of the discipline. Relevant sidebars, stunning photos, and a glossary aid readers' understanding of the topic. A hands-on project and career-planning chart give readers a sense of what it takes to become an engineer. Additional features include a table of contents, a selected bibliography, source notes, and an index, plus essential facts about each featured feat of engineering. Aligned to Common Core Standards and correlated to state standards. Essential Library is an imprint of Abdo Publishing, a division of ABDO.

Implement TMR with Your Patients and Improve Their Quality of Life Developed by Dr. Todd A. Kuiken and Dr. Gregory A. Dumanian, targeted muscle reinnervation (TMR) is a new approach to accessing motor control signals from peripheral nerves after amputation and providing sensory feedback to prosthesis users. This practical approach has many advantages over other neural-

machine interfaces for the improved control of artificial limbs. Targeted Muscle Reinnervation: A Neural Interface for Artificial Limbs provides a template for the clinical implementation of TMR and a resource for further research in this new area of science. After describing the basic scientific concepts and key principles underlying TMR, the book presents surgical approaches to transhumeral and shoulder disarticulation amputations. It explores the possible role of TMR in the prevention and treatment of end-neuromas and details the principles of rehabilitation, prosthetic fitting, and occupational therapy for TMR patients. The book also describes transfer sensation and discusses the surgical and functional outcomes of the first several TMR patients. It concludes with emerging research on using TMR to further improve the function and quality of life for people with limb loss. With contributions from renowned leaders in the field, including Drs. Kuiken and Dumanian, this book is a useful guide to implementing TMR in patients with high-level upper limb amputations. It also supplies the foundation to enable improvements in TMR techniques and advances in prosthetic technology.

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