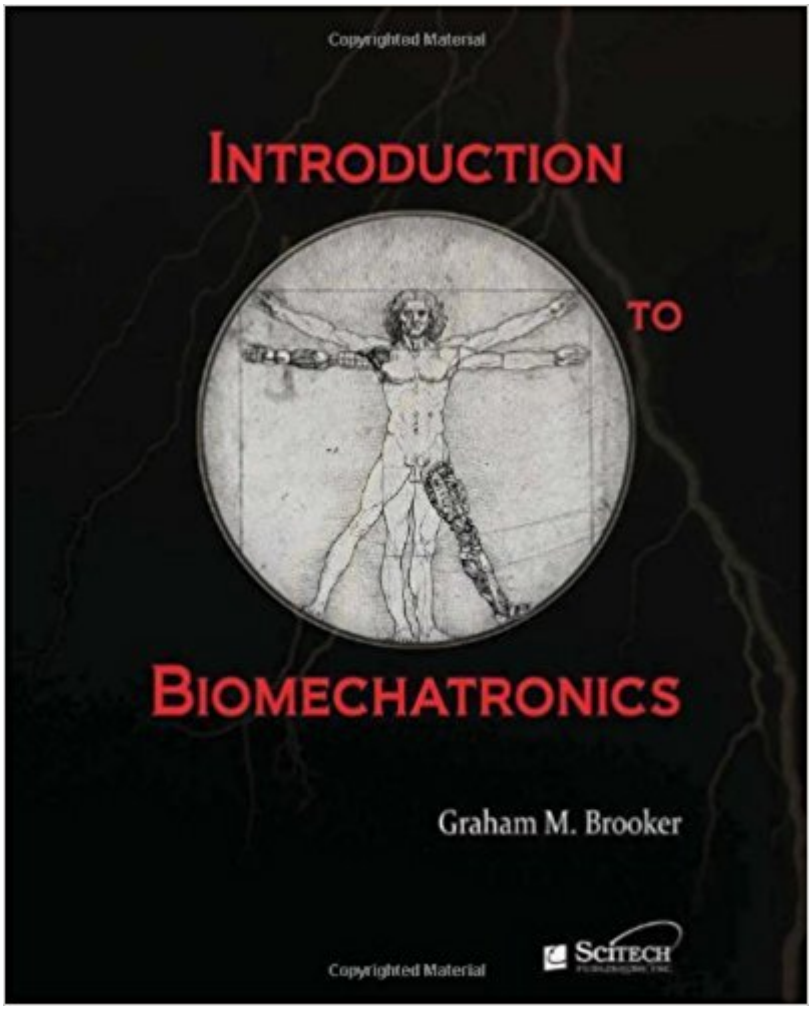
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Introduction To Biomechatronics (Materials, Circuits And Devices)



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Synopsis

This is the age of biomechatronics, a time where mechanics and electronics can interact with human muscle, skeleton, and nervous systems to assist or replace limbs, senses, and even organs damaged by trauma, birth defects, or disease. Introduction to Biomechatronics 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. The first half of the book provides the engineering background to understand all the components of a biomechatronic system: the human subject, stimulus or actuation, transducers and sensors, signal conditioning elements, recording and display, and feedback elements. It also includes the major functional systems of the body to which biomechatronics can be applied including: biochemical, nervous, cardiovascular, respiratory, and musculoskeletal. The second half discusses five broadly based inventions from a historical perspective and supported by the relevant technical detail and engineering analysis. It begins with the development of hearing prostheses including middle-ear implantable hearing devices and the amazingly successful cochlear implant. This is followed by sensory substitution and visual prostheses that researchers hope will do the same for the blind as the cochlear implant has done for the deaf. The last three chapters are more mechatronic in focus, examining artificial hearts, respiratory aids from the iron lung to the latest CPAP devices, and finally artificial limbs from the first hooks and peg legs to limbs that move and have a sense of touch. Introduction to Biomechatronics provides readers with the engineering background to analyze and design biomechatronic devices, and inspires them to greater designs by discussing successful inventions that have done the most to improve our lives.Supplementary material can be found at the IET’s ebook page

Book Information

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Customer Reviews

"I highly recommend this book for any student, healthcare professional, or O&P practitioner who wants to learn about how to better control the devices we provide to our patients. If you want to demystify the C-LegÃ Â© or ProprioÃ Â© foot, this text can help. With a basic understanding of biomechatronics, the O&P practitioner can sit at the design table with other engineers and together create devices that make our patient's lives better." (Mark D. Muller, MS)

Graham Brooker

"Introduction to Biomechatronics" is a well-formatted and comprehensive survey of biomechatronic concepts and applications. Biomechatronics is the engineering integration of electronic control and mechanical actuation into biological organisms. Brooker has created a pioneering text that captures the fundamental methods and practical use of biomechatronic technology.The first half of the book provides the reader with a strong foundation of general concepts and methods for developing biomechatronic systems. Chapter 1 gives an introduction to the field, from both an internal physiological and external interface point of view. Chapter 2 dives into sensors and transducers, which teaches the reader about biometrics and the methods of measuring physiological signals. Chapter 3 details how the use of different actuation technologies provides productive operation of human functions. Chapters 4 and 5 outline the fundamental engineering sciences of feedback and control systems, as well as signal processing, including DSP.The second half of the book exposes the reader to a variety of practical biomechatronics applications, from historical approaches to the current state of the art. This is where Brooker shines as an expert in the field. He provides a detailed exploration of hearing aids and implants, including bone-anchored hearing aids and middle ear implants. He even tackles the less mature field of sensory substitution, which is an exciting and enlightening subject with tremendous industry potential. Brooker's research into heart and respiratory aids gives the reader thorough insight into human physiology, medical challenges, rehabilitative problems, and assist device technology. The book concludes with a systematic exploration of active and passive prosthetic limbs, including kinematic models, sensing, and

actuation.It is difficult for me to nail down a single favorite part of this book. For those of us already in the field, the first half of the book was a nice review of general mechatronic concepts. However, once Brooker transitioned into the biomedical applications, he had my attention and imagination captured. I enjoyed his mixture of history, physiology, engineering science, and state of the art technology. As a researcher of rehabilitative biomedical technologies, I was especially intrigued by the cardiac and respiratory aids, as well as the prosthetic limbs.As is, this is a great text for a graduate-level engineering course. I used it as such. If this text gets revised, I would like to see problem sets at the end of each chapter. Brooker gives solid examples throughout the text, but students and instructors alike would benefits from more worked examples and application-level problems or projects.I chose this book for a graduate level biomechatronics engineering class and I am delighted with it. The students enjoyed the content approach and the graphics throughout the book. Many class discussions were generated by Brooker’s insightful topics and examples. This would be a fruitful text for the biomechatronics instructor and student."Introduction to Biomechatronics" teaches the reader about the fundamental concepts of biomechatronic technologies and the practical application of biomechatronic systems. Students, instructors, engineers, and those who are interested in biomechatronics at any level will benefit from this book. New students will get an overview of biomechatronic techniques. Biomedical engineers will get a survey of current applications. Readers will grow from Brooker’s teaching and learn how to put biomechatronic principles into application.

This is a wonderful book. Very informative and knowledgeable, covering a broad range. Well laid out, well written with appropriate images. In very pleased to own it, and would definitely recommend it to anyone interested in the field.

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