

Book review: Vladimir Medved Editor: Measurement and Analysis of Human Locomotion

AUTHOR:

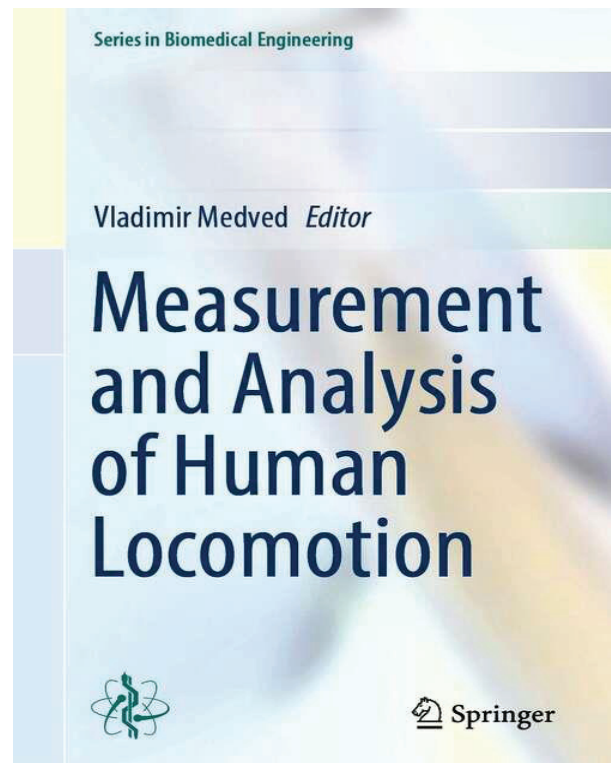
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Human movement is of interest in many areas such as sports, medicine, artistic performance, and also, with a slightly broader perspective, ergonomics, traffic sciences, didactics, etc. A modern approach to the study of movement and locomotion of the gross human body is characterized by “capturing” and, consequently, analysis and diagnostics of the movement phenomenon, based on the laws of classical physics and of physiology. This also is the focus of this book, which aims to introduce, concisely describe, explain and illustrate uses of this sort. Among the mentioned areas of application, the book is primarily focused on medicine and sports activities.

Starting from a historical perspective, the idea of studying human locomotion using technical measurement devices and including measurement data in the physical representation and quantification of gross body movements, as a kind of umbrella concept, is presented and explained; an approach known as inverse dynamics. Within this approach, the components of measurement systems, including relevant signal and data processing methods are presented. Modern devices for motion capture of the human body by measuring its kinematics, kinetics and surface electromyography (surface EMG) are described; all systems being used predominantly - albeit not exclusively - in a laboratory for human movement analysis setting. With an orientation mainly on posture and gait, but including selected examples of movement patterns while practising kinesiological and sports activities, the book presents the basics of a biomechanical and biomedical engineering approach to this subject matter. It illustrates how data collected and processed by modern technical devices and procedures can complement the traditional expertise of kinesiologists and/or physicians.

After the Preface and the Introduction, the topics covered are: history of locomotion study and current research methodology; evolution of human gait; elements of biomechanics of the lumbar spine; measuring kinematics and kinetics of human movement; elaboration of 3D photogrammetry; pedobarography - standardization of measurement protocols and clinical applications; kinesiological electromyography; gait analysis; critical issues in orthopedic traumatology; on sportive movement patterns study: 12 chapters altogether. As a practical addendum to the book, at the end several current standards for reporting of kinematic, kinetic, and EMG data are reprinted. The standards, reflecting state of art practical knowledge in the field, are meant to help in pursuing both measurements and applications of modeling complex neuro-musculo-skeletal systems and functions. The Index closes the book. The book has XI + 371 pages; 103 b/w illustrations and 125 illustrations in color.

Measurement and analysis of human locomotion is a multidisciplinary and interdisciplinary topic that requires cooperation among biomedical engineers, medical doctors of several specialties, and kinesiologists. Motivated by the need for teaching material of the eponymous course within the Medical Studies in English at the Faculty of Medicine, the University of Zagreb, which (course) has



been taught since 2005, the book is also applicable more widely as a scientific reference, a textbook at the departments of engineering, of medicine, and of kinesiology, i.e. as a reference for the appropriate institute and clinical work environments. It is applicable in the field of sports, physical activities as well as in medical diagnostics and rehabilitation. Practical applications may, for example, be the assessment of human gait efficiency; assessment of local skeletal muscle fatigue during physical exercise; biomechanical evaluation of traumatic conditions requiring orthopedic treatment and the like.

“**Measurement and analysis of human locomotion**” is the work of a multidisciplinary author team. The book’s editor is **Vladimir Medved**, Faculty of Kinesiology, University of Zagreb, (professor emeritus) and team consists of: **Daniele Albano**, Department of Human, Philosophical and Educational Sciences, University of Salerno, Italy; **Boris Božić**, Clinic for Neurosurgery, Clinical Hospital Center Sestre milosrdnice, Zagreb; **Mario Cifrek**, Faculty of Electrical Engineering and Computing, University of Zagreb, **Nikica Daraboš**, Faculty of Medicine, University of Split; **Igor Gruić**, Faculty of Kinesiology, University of Zagreb; **Maja Mirković**, Kineematika-Polyclinic for Orthopedics, Physical Medicine and Rehabilitation, Zagreb; **Marko Pećina**, Faculty of Medicine, University of Zagreb (professor emeritus); **Tomislav Pribanić**, Faculty of Electrical Engineering and Computing, University of Zagreb; **Marija Rakovac**, Faculty of Kinesiology, University of Zagreb, and **Rodolfo Vastola**, Department of Human, Philosophical and Educational Sciences, University of Salerno, Italy.

The book is a part of Springer Series in Biomedical Engineering.