Preface

During the last few years, there has been increasing interest in the application of virtual reality and information and communication technologies (ICTs) in the field of rehabilitation, with clinical results that prove their effectiveness.

New technologies such as Kinect, virtual reality, sensors, augmented reality, eye tracking, 3D printers, etc. allow us to develop innovative solutions for assistance, prevention, and rehabilitation in patients. In this way, the new technologies can help patients to function more easily in their everyday lives and can also make it easier for a caregiver care them.

The main focus of this book titled *New Technologies to improve Patient Rehabilitation* has been to explore how technology can contribute toward smarter and effective rehabilitation methods. Contained herein are 15 chapters:

Chapter 1 presents a conceptual framework to encourage the research community to develop more comprehensive and adaptive ICT solutions for prevention and rehabilitation of chronic conditions in the daily life of the aging population and beyond health facilities. Chapter 2 investigates and presents a virtual system for balance control assessment that is used to implement a virtual task for balance tracking in real time at home. Chapter 3 explores how gaze tracking (GT) can provide more accurate and direct indicators about the cognitive processes in rehabilitation. Chapter 4 investigates the design and manufacture of medical devices, such as lower limb prosthesis, integrating low-cost industrial technologies. In particular, it focuses attention on the custom-fit component of a lower limb prosthesis, i.e., the socket, that is the interface with the residual limb. Chapter 5 investigates an auditory feedback-based system for treating autism spectrum disorder. The system for real-time gesture tracking is presented, used in active well-being self-assessment activities and in particular applied to medical coaching and music therapy. Chapter 6 presents a balance measurement software based on Kinect2 sensor, which is evaluated by comparison with the Wii balance board in a numerical analysis level, and further improved according to the consideration of BFP (body fat percentage) values of the user. Chapter 7 presents a study testing the efficacy of an alternative mHealth approach using tablets and serious games to stimulate cognitive functions in recovering addicts. In Chapter 8, a balance measurement software based on Kinect2 sensor is evaluated and compared with the gold standard balance measure platform intuitively. The software analysis uses the tracked body data from the user via the Kinect2 sensor and gets the user's center of mass (CoM) and motion route on a plane. Chapter 9 presents a model based on games to improve auditory verbal therapy, which is carried out with deaf children who have benefited from a cochlear implant. In Chapter 10 the author presents how the virtual reality can support a hyperbaric oxygen therapy. In Chapter 11, the authors have devised a system based on the combined use of low-cost virtual reality visors, like Google Cardboard, and ad hoc developed games for smartphones to improve amblyopia. Chapter 12 provides a summary of previous studies that incorporated computer games for CP rehabilitation.

Moreover, a comprehensive game-based rehabilitation framework is presented to enable CP children to actively participate in upper-limb physical exercises. Chapter 13 reports a study in which the authors tested the relation between neuropsychological functions and abstinence after an alcohol rehabilitation treatment. Chapter 14 analyzes how the interaction process of editing exercises in a virtual rehabilitation environment is affected when using Web applications and devices such as Microsoft Kinect. Chapter 15 presents the experiment and design of a system for rhythmic rehabilitation based on a stationary bike augmented in an audio reality.

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Habib M. Fardoun
Victor M.R. Penichet
Daniyal M. Alghazzawi
M. Elena De la Guia

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