B·DEBATE International Center for Scientific Debate BARCELONA

HERMANO IGO KREBS

CV

PARTICIPANT AT:

BRAIN HEALTH.
FROM GENES TO BEHAVIOUR, IMPROVING OUR LIVES

October, 6th-7th, 2015, Barcelona

Hermano Igo Krebs, Principal Research Scientist & Lecturer, Mechanical Engineering Department, Massachusetts Institute of Technology, Cambridge, USA

Hermano Igo Krebs joined MIT's Mechanical Engineering Department in 1997 where he is a Principal Research Scientist and Lecturer – Newman Laboratory for Biomechanics and Human Rehabilitation. He also holds an affiliate position as an Adjunct Professor at University of Maryland School of Medicine, Department of Neurology, and as a Visiting Professor at Fujita Health University, Department of Physical Medicine and Rehabilitation, at University of Newcastle, Institute of Neuroscience, and at the Mechanical Engineering Department of Osaka University. He is one of the founders and member of the Board of Directors of Interactive Motion Technologies, a Massachusetts-based company commercializing robot technology for rehabilitation. He is a Fellow of the IEEE (Institute of Electrical and Electronics Engineers). Dr. Krebs was nominated by two of IEEE societies: IEEE-EMBS (Engineering in Medicine & Biology Society) and IEEE-RAS (Robotics and Automation Society) to this distinguished engineering status "for contributions to rehabilitation robotics and the understanding of neuro-rehabilitation." Dr. Krebs has published and presented extensively on rehabilitation robotics, particularly applied to stroke and neuro-recovery. His work goes beyond Stroke and has been extended to Cerebral Palsy for which he received "The 2009 Isabelle and Leonard H. Goldenson Technology and Rehabilitation Award," from the Cerebral Palsy International Research Foundation (CPIRF). In 2015, he received the prestigious IEEE-INABA Technical Award for Innovation leading to Production "for contributions to medical technology innovation and translation into commercial applications for Rehabilitation Robotics." His goal is to revolutionize the way rehabilitation medicine is practiced today by applying robotics and information technology to assist, enhance, and quantify rehabilitation.

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ABSTRACT

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Robot Assisted Rehabilitation: the MIT Perspective

The field of rehabilitation robotics has grown steadily over the past decade, making significant clinical contributions. Studies have demonstrated both the efficacy and advantages of robotics for assessing and treating motor impairment with guidelines, such as the 2010 American Heart Association's "Comprehensive Overview of Nursing and Interdisciplinary Rehabilitation Care of the Stroke Patient," endorsing robotic therapy for the upper extremity (UE), but not for the lower extremity (LE) [1]. In 2010, the US Veterans Administration similarly endorsed robotic therapy for UE but not for LE: "recommendation is made against routinely providing the [LE] intervention... At least fair evidence was found that the intervention is ineffective ..." [2] This apparent immaturity of LE robotic therapy reflects the fact that, to date, knowledge of human motor control has not been applied to LE robotic therapy. Knowledge of human motor control, sensing, and cognition has matured to the point that a fundamental and unifying theory of movement for both UE arm movement and for LE walking is now within reach. Here, I will discuss some of the evidence supporting our working model based on submovements, oscillations, and impedances for UE movement collected with the MIT-Manus [3-7] and how we plan to develop a competent model that encompass both arm movement and walking based on these elementary actions and how to code it into adaptive controllers that will allow multiple robotic devices to target rehabilitation [8].

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