TUM

ENB Elite Master Program Neuroengineering (MSNE)
Invited Presentation

Prof. Dr. Dr. h.c. Robert Riener
ETH Zurich & University of Zurich

Neurorehabilitation Robotics:
Mechatronic Solutions for People with Movement Disorders

Abstract: Robots for the upper and lower limbs can be very useful to restore movement abilities in two ways. First, they can promote neurorehabilitation as training devices after neurological injuries such as spinal cord injury (SCI), traumatic brain injury and stroke. Second, they can be used as assistive devices to support patients or elders with gait impairments in daily life situations. However, current mechatronic solutions are still too bulky, too heavy, with too little battery power, and thus, too inconvenient to use. Furthermore, the sensory technologies and control strategies are still too primitive to allow the correct motion intention and to provide effective assist-as-needed support. These disadvantages result to unsatisfactory performance and discomfort. In this talk I will present current engineering solutions and future trends of stationary gait and arm training robots as well as wearable exoskeleton devices that can be used for training and assistance in daily life. I will also present the Cybathlon, which is a new kind of championship, where people with physical disabilities compete against each other at tasks of daily life, with the aid of robotic technologies. The next Cybathlon will take place in Zurich, on May 2nd and 3rd 2020.

Biography: Robert Riener studied Mechanical Engineering at TU München, Germany, and University of Maryland, USA. He received a Dr.-Ing. degree in Engineering from the TU München in 1997. After postdoctoral work from 1998-1999 at the Centro di Bioingegneria, Politecnico di Milano, he returned to TU München, where he completed his Habilitation in the field of Biomechatronics in 2003. In 2003 he became assistant professor at ETH Zurich and Spinal Cord Injury Center of the University Hospital Balgrist ("double-professorship"); since 2010 he has been full professor for Sensory-Motor Systems, ETH Zurich. Riener has published more than 400 peer-reviewed journal and conference articles, 20 books and book chapters and filed 24 patents. He has received 22 personal distinctions and awards including the IEEE TNSRE Best Paper Award 2010, and the euRobotics Technology Transfer Awards 2011 and 2012. Riener's research focuses on the investigation of the sensory-motor interactions between humans and machines. Riener is the initiator and organizer of the Cybathlon, which was honored with the European Excellence Award and the Yahoo Sports Technology Award. In 2018 Riener obtained the honorary doctoral degree from the University of Basel.

The Talk is hosted by Prof. Gordon Cheng (Institute For Cognitive Systems)

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All talks in the MSNE Invited Speaker Series are open to students, staff, and members of the public. Attendance is free.

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