

# Distinguished Lecturer Series

**Prof. Robert Riener, ETH (Zurich)**

## Robots that Cooperate and Motivate



Robotic technologies play an increasingly important role in neurorehabilitation and motor learning research in sports. However, most robots work with patients in a “master-slave” relationship, thus, forcing the patient to follow a predetermined motion without consideration of voluntary efforts or behaviour of the patient. During such unidirectional communication, the loop is not closed by the human in order to adjust the device to the biomechanical or physiological state of the patient, or his/her engagement and intention. We developed novel rehabilitation robots that offer a new approach by placing the human into the loop. Our robots enable a bi-directional interaction and assist in a compliant way, just as much as needed, so that the interfacing human subject can contribute to the movement with own voluntary effort. The subject is challenged in a moderate but engaging and motivating way without causing undue stress or harm. In this talk, I will present examples of patient-cooperative control that have been implemented in our novel robots applied to the neurorehabilitation of gait and arm as well as to motor learning in sports.

Robert Riener is full professor for Sensory-Motor Systems at the Department of Health Sciences and Technology, ETH Zurich, and professor of medicine at the University Clinic Balgrist, University of Zurich. Riener has published more than 400 peer-reviewed journal and conference articles, most of them as first or last author, 2 monographs, 19 book chapters and he has filed more than 20 patents. He has received more than 15 personal distinctions and awards including the Swiss Technology Award in 2006, 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 actions in and interactions between humans and machines. This includes the study of human sensory-motor control, the design of novel user-cooperative robotic devices and virtual reality technologies, and the investigation of human movement and psychophysiological engagement. Main application areas are in the fields of rehabilitation, medical education and sports.

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### Opening Lecture:

**Dr. Jai Prakash, UT**

### Cell-specific Targeted Therapies: the Future of Medicine



Dr. Prakash is Assistant Professor at Department of Controlled Drug Delivery in MIRA. He has an educational background in pharmacy and obtained his PhD (*cum laude*) from the University of Groningen. After his Ph.D., he worked on a joint position at BiOrion Technologies and the University of Groningen for several years. Thereafter, he joined Karolinska Institutet in Sweden as Assistant Professor where he received many prestigious grants from Swedish Cancer Foundation, FP7 Marie Curie program and Swedish Research Council. Last year in September, he started as a Tenure-track Assistant Professor at University of Twente.

His research is focused on cell-specific targeting to tumor stroma and fibrotic diseases in order to develop new therapies against cancer and fibrosis.

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**Thursday 16<sup>th</sup> May 2013 – Horst C101 – 16.00 hr.**