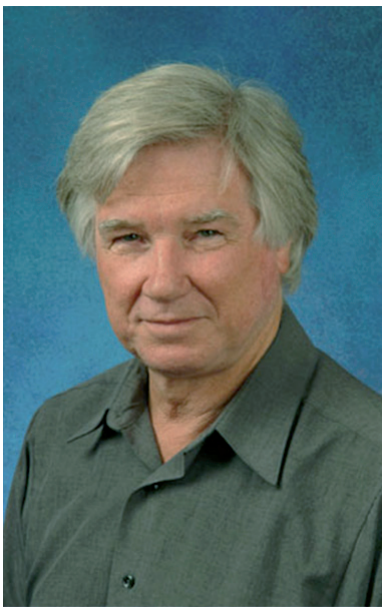
Keynote speakers

Edgerton, V. Reggie

Tuesday, June 28, 09:10 - 09:45, Physiological rational for Assist-as-Needed control in facilitation of recovery of stepping



Distinguished Professor
Department of Integrative Biology & Physiology
University of California, Los Angeles
www.ibp.ucla.edu/research/edgerton

Dr. V. Reggie Edgerton received his Ph.D. in Exercise Physiology from Michigan State University and has been at the University of California, Los Angeles, since 1968. Dr. Edgertons laboratory focuses on two main research questions. One is, how, and to what extent, does the nervous system control protein expression in skeletal muscle fibers? Whole muscle, single motor units and single muscle fibers are studies physiologically and biochemically. Light and confocal microscopy including quantitative enzyme analyses and immunofluorescent microscopy are some of the experimental methods used to study motor unit plasticity. The principal animal models used are spinal cord injury, spaceflight and surgically induced compensatory hypertrophy. These studies have shown that although the nervous system has a significant influence on the kind and amount of specific proteins synthesized, there are factors intrinsic to individual fibers that also define these properties. The results show also that the neural influence that is associated with muscle fiber types is probably not mediated via the amount or pattern of activity of the motor units. The second is how the neural networks in the lumbar spinal cord of mammals, including humans, control stepping and how this stepping pattern becomes modified by chronically imposing specific motor tasks on the limbs after complete spinal cord injury. Limb motion, electromyographic and kinetic data are recorded to define locomotor characteristics. These studies have shown that the mammalian spinal cord can learn specific complex motor tasks such as standing and stepping. Considerable effort is focused on integrating neural models of locomotion with actual musculoskeletal properties that are subject specific. Another component of the modeling tasks is to develop robotic devices that can quantify and assist laboratory animals and humans with neuromuscular deficits to walk. A similar device is being developed for use by crewmembers in maintaining a critical level of control of locomotion in variable gravitational environments.

Rizzo, Skip

Tuesday, June 28, 09:45 - 10:20, Virtual Rehabilitation: Emerging opportunities and challenges for promoting access

Associate Director, The Institute for Creative Technologies
Research Professor, Dept. of Psychiatry and the School of Gerontology
University of Southern California, Los Angeles, CA., USA
http://vrpsych.ict.usc.edu

Albert “Skip” Rizzo is a Clinical and Neuro- Psychologist, Associate Director of the University of Southern California Institute for Creative Technologies and a Research Professor in Psychiatry and in Gerontology. Skip conducts research on the design, development and evaluation of VR systems targeting the areas of clinical assessment, treatment and rehabilitation. His cognitive work has addressed the use of VR applications to test and train attention, memory, visuospatial abilities and executive function. In the motor domain, he develops VR game-based applications to promote rehabilitation in persons with CNS dysfunction (e.g., stroke and TBI). And in the psychological domain, he has directed the development / implementation of the Virtual Iraq/Afghanistan VR exposure therapy system for combat-related PTSD and is involved in translating these simulation assets for PTSD assessment and prevention (stress resilience). He is also involved with ICT collaborators in the creation of artificially intelligent virtual human patients that clinicians can use to practice skills required for

challenging clinical interviews and diagnostic assessments (sexual assault, resistant patients, etc.) and for creating online virtual human healthcare guides for breaking down barriers to care in psychological health and TBI. In his spare time, Skip enjoys playing rugby, riding motorcycles, listening to music and dreaming about ways that VR will improve clinical care and research.

Allum, John HJ

Tuesday, June 28, 14:00 - 14:45, Improving impaired balance function for posture and gait: on-line versus carry-over effects of prosthetic feedback

Head of Audiology and Neurootology
ORL University Clinic, Basel, Switzerland
Cochlear Implant Clinic Centre: www.unibas.ch/hno/audio and
Neurootology Research: www.unibas.ch/hno/neurooto

Prof. Allum obtained his first degree (BSc) in mechanical engineering at Birmingham University, England. He held one of the first Kennedy Scholarship awards for study at the MIT. After receiving a MSc and DSc in Biomedical Engineering at MIT, he worked for several years as a neurophysiologist and developer of medical diagnostic equipment, first at the University Neurology Clinic in Freiburg/Germany, and later at the Brain Research Institute in Zurich/Switzerland. He has been Head of the Department of Audiology and Neurootology at the University ORL Clinic in Basel/Switzerland for several years where his main clinical duties include managing diagnostic and rehabilitation programs for patients with hearing and balance disorders. His scientific interests are concentrated on understanding neurophysiological mechanisms underlying balance control in man and on developing balance prostheses for persons with poor balance control. He has published over 200 peer-reviewed papers and holds several patents. Prof Allum speaks English, Spanish, and German.

Blanke, Olaf

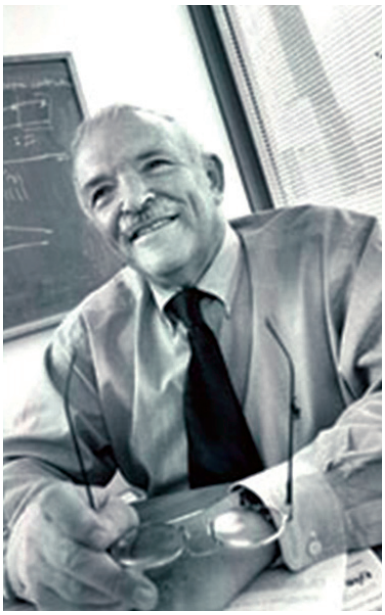
Wednesday, June 29, 08:20 - 09:00, Cognitive Neuro-Prosthetics: From virtual limbs and avatars to robotic chairs

Professor, Director of the Laboratory of Cognitive Neuroscience at the Swiss Federal Institute of Technology (Ecole Polytechnique Fédérale de Lausanne), Switzerland
Consultant neurologist at the Department of Neurology (University Hospital of Geneva), Switzerland

Olaf Blanke pioneered the neuroscientific study of human self-consciousness and subjectivity by using a broad range of methods such as the neuropsychology and electrophysiology of self-consciousness in neurological disease as well as brain imaging in healthy subjects. His main interest at present is the development of a data-driven neuroscientific theory of self-consciousness and subjectivity. Another main line of research concerns balance and body perception, and their application to engineering-based technologies such as virtual reality, robotics, and neuro-rehabilitation.

Rymer, W. Zev

Wednesday, June 29, 09:00 - 09:40, Rehabilitation robotics - closing the gap between expectation and current clinical performance



John G. Searle Chair in Rehabilitation Research
Vice President for Research
Director, Sensory Motor Performance Program
Rehabilitation Institute of Chicago, USA
Professor, Departments of Physical Medicine & Rehabilitation,
Physiology, and Biomedical Engineering
Northwestern University
www.ric.org/aboutus/people/doctors/detail.aspx?doctorID=15

W. Zev Rymer (M'94) received the M.B.B.S. degree from Melbourne University, Australia, in 1962. After residency training in internal medicine and neurology, he returned to graduate training and received the Ph.D. degree in neurophysiology from Monash University, Australia. After postdoctoral training at the National Institutes of Health and Johns Hopkins University Medical School, Baltimore, MD, he became an Assistant Professor of Neurosurgery and Physiology at the State University of New York, Syracuse. In 1978, he became an Assistant Professor of Physiology at Northwestern University Medical School, Chicago, IL. He now holds the John G. Searle Chair in Rehabilitation Research and is Vice President for Research at the Rehabilitation Institute of Chicago, while also holding appointments as Professor of Physiology and Biomedical Engineering at Northwestern University and at Hines VA, Hines, IL. He is also Director of the Medical Biomechanics Program at Northwestern University Medical School. His laboratory receives support from the National Institutes of Health, the Department of Education (NIDRR), and the Veterans Administration.

Winstein, Carolee

Wednesday, June 29, 14:00 - 14:40, The future of neurorehabilitation: best practice is theoretically inspired, grounded in science and patient-centered

Professor, Director of Research and Motor Behavior and Neurorehabilitation Laboratory
Biokinesiology and Physical Therapy
University of Southern California, Los Angeles, California, USA
http://pt2.usc.edu/labs/mbnl/

Carolee J. Winstein, PhD, PT, FAPTA is professor of Biokinesiology and Physical Therapy and directs the Motor Behavior and Neurorehabilitation Laboratory, University of Southern California, Los Angeles, CA, USA. She holds a joint appointment in the Department of Neurology, USC Keck School of Medicine. She is best known for work concerned with the functional neural and behavioral basis of motor control and learning and its relationship to neurorehabilitation. She has published extensively on scientifically derived neurorehabilitation approaches to enhance recovery and repair after adult onset stroke. Winstein is principal investigator (PI) for the first clinical research network, PTClinResNet, funded by the Foundation for Physical Therapy; she is Co-PI of the first National Institutes of Health (NIH) phase III Multi-site Randomized Control Trial of a rehabilitation intervention for upper extremity recovery in stroke, Extremity Constraint-Induced Therapy Evaluation (EXCITE); she is PI for an individual investigator NIH funded grant, Brain and Behavioral Correlates of Arm Rehabilitation after Stroke, a companion to EXCITE; and Co-PI of a NIH roadmap planning and exploratory project, the Interdisciplinary Study of Neuroplasticity and Stroke Rehabilitation (ISNSR). In 2005, she was appointed to the National Advisory Board on Medical Rehabilitation Research (NABMRR) of the National Institute of Child Health and Human Development (NICHD) of the NIH. Recent research efforts that provide critical background and experience for the development of innovative approaches in neurorehabilitation include: 1) feasibility of Novel Virtual Environments and Constraint-Induced

Movement Therapy (NIH Phase I STTR), 2) Safety and Effectiveness of Cortical Stimulation in the Treatment of Upper Extremity Hemiparesis (Northstar Neuroscience, Inc.). Two ongoing large-scale funded collaborations include the National Institute on Disability and Rehabilitation Research's Rehabilitation Engineering Research Center - "Optimizing Participation through Technology (OPTT)" and NIH (NINDS, NICHD) Interdisciplinary Comprehensive Arm Rehabilitation Evaluation (ICARE) Stroke Initiative, a Multi-Center phase III Randomized control Trial, Interdisciplinary Comprehensive Arm Rehabilitation Evaluation (ICARE).

Lüth, Tim

Wednesday, June 29, 14:40 - 15:20, TUM Agetech: A framework for pervasive medical devices for elderly

Professor and director Institute for Micro Technology and Medical Device Technology
Managing director
Institute for Mechatronics
Technical University of Munich, Germany
www.mw.tum.de/index.php?cid=939

Tim C. Lüth was born in Hamburg, Germany, in 1965. He received his degree in electrical engineering from the Darmstadt University of Technology, Darmstadt, Germany in 1989. Afterwards, he received the Ph.D. degree in robotics and habilitation in computer science from the University of Karlsruhe in 1993 and 1997, respectively. In 1994-1995, he was a Visiting Researcher at the MITI-AIST Electrotechnical Laboratory in Tsukuba, Japan. In 1997, Lüth became Professor for surgical navigation and robotics at the medical school Charité-Universitätsmedizin Berlin of the Humboldt University at Berlin. In 2001, he became the Director for Mechatronic Medical Technology at the Fraunhofer-Institute for Production Systems and Design Technology IPK. Since 2005, Lüth works as Professor, Chair, and Director of the Institute of Micro Technology and Medical Device Technology of the University of Technology, Munich. In 2006, he received a professor status at the University of Toronto, Canada. The European Patent Office elected him in 2007 as TOP-3 inventor in the category "lifetime achievement" for his patent activities in the area of surgical robotics and navigation. He received several national and international awards for his research on medical devices. In 2010, Lüth became elected Member of "acatech," by the German National Academy for Science and Technology. Current research topics are Assistant Systems for an Aging Society, Robotics, Automation, Navigation for Surgery, and Rapid Prototyping of Mechatronics Systems.

Herr, Hugh

Thursday, June 30, 09:00 - 09:40, Neuromuscular model of human walking: implication on prosthetic leg design

Associate Professor, Media Arts and Sciences
Associate Professor, MIT-Harvard Division of Health Sciences and Technology
Director of the Biomechatronics Group
Massachusetts Institute of Technology
http://biomech.media.mit.edu/people/herr.htm

Hugh Herr is pioneering new research directions for a new class of biohybrid, "smart" prostheses; these devices are accelerating the merging of body and machine, improving the lives of amputees and other physically challenged individuals, and amplifying the endurance and strength of everyone. Herr has employed cross-bridge models of skeletal muscle to the design and optimization of a new class of human-powered mechanisms that amplify endurance for cyclic anaerobic activities. He has also built elastic shoes that increase aerobic endurance in walking and running. In the field of human rehabilitation, Herr's group has developed gait adaptive knee prostheses for transfemoral amputees and variable impedance ankle-foot orthoses for patients suffering from drop foot, a gait pathology caused by stroke, cerebral palsy, and multiple sclerosis. Herr received his BA in physics from Millersville University of Pennsylvania, an MS in mechanical engineering from MIT, and a PhD in biophysics from Harvard University. Prior to coming to the Media Lab, Herr was assistant professor at the Harvard-MIT Division of Health Sciences and Technology and the Department of Physical Medicine and Rehabilitation, Harvard Medical School.

Courtine, Grégoire

Friday, July 1, 09:00 - 09:40, Robotic and neuroprosthetic systems for neurorehabilitation after spinal cord injury

Experimental Neurorehabilitation laboratory
Faculty of Medicine
August Forel-Strasse 7
8008 Zürich
www.neuroscience.uzh.ch/research/motor_systems/courtine

Prof. Dr. Grégoire Courtine was originally trained in Mathematics and Physics, but received his PhD degree in Experimental Medicine from the University of Pavia, Italy, in 2003. From 2004-2007, he held a Post-doctoral Fellow position at the Brain Research Institute, University of California, Los Angeles (UCLA), USA, under the supervision of Dr. Reggie Edgerton. In 2008, he established his own research laboratory at the Faculty of Medicine, University of Zurich, Switzerland, where he also is a member of the Rehabilitation Initiative and Technology Platform Zurich (RITZ). The main focus of the lab includes the development and use of neuroprosthetic systems, robotic interfaces, pharmacological cocktails, neuroregenerative therapies, and neurorehabilitation interventions to promote the recovery of motor functions after neurological impairments such as spinal cord injury or stroke. His laboratory addresses a remarkably diversified range of research paradigms in mice, rats, cats, monkeys, and humans. In the past four years, he published several articles in Nature Neuroscience and Nature Medicine, which were discussed in national and international press extensively. He received numerous honors and awards such as the 2007 Chancellor's award for excellence in post-doctoral research from UCLA and the 2009 Schellenberg Prize for Research that was awarded by the International Foundation of Research in Paraplegia.