

Sunday, September 21, 2008

All Workshops are being held at the IMTEK- Institute, Building 101

09:00 - 12:30	W1: Pre-Conference Workshop 1 FESAir-Electrical Stimulation in Physiotherapy
09:00 - 12:30	W2: Pre-Conference Workshop 2 Microelectrode Array Technologies
13:30 - 17:00	W3: Pre-Conference Workshop 3 FES for upper limb rehabilitation
13:30 - 17:00	W4: Pre-Conference Workshop 4 Functional Electrical Stimulation and restorative neuroscience
19:00 - 22:00	Welcome Reception Concert Hall

Monday, September 22, 2008

08:15 - 09:00	KN1: Keynote Lecture 1 Influencing mood by electromagnetic stimulation Malek Bajbouj (Charité Berlin, Germany); Angela Merkl (Charité Berlin, Germany) Mood disorder can severely impair the quality of life and lead to death in up to 15% of patients. In general, mood disorders are well treatable with classical psychopharmacological and psychotherapeutic interventions. However, a considerable number of depressive patients do not respond to or remit during these therapeutical interventions resulting in an increasing interest and need in alternative strategies to treat mood disorders. Among the most promising approaches are brain stimulation techniques, which usually use electromagnetic stimuli to directly or indirectly influence mood relevant brain structures. These neuromodulatory methods comprise older therapies like electroconvulsive therapy and novel approaches like repetitive transcranial magnetic stimulation, magnetic seizure therapy, vagal nerve stimulation, and deep brain stimulation. Although these novel therapeutic techniques hold considerable promise, there still will be need to be further developed before they achieve clinical acceptability.
09:00 - 10:30	S1: Oral Session 1 Neuromodulation Session Chairs: Malek Bajbouj (Charité Berlin, Germany) Milos Popovic (University of Toronto, Canada)
09:00	Cervical electrical stimulation to the left neck with surface electrodes for treatment of intractable epilepsy Atsuko Yoshida (Tohoku University Graduate School of Medicine, Japan); Kazunori Seki (Tohoku University Graduate School of medicine, Japan)

- 09:15 **Vagus nerve activity based prediction of epileptic seizures in rats**
Kristian Rauhe Nielsen (Aalborg University, Denmark); Cristian Sevcencu (Aalborg University, Denmark); Johannes Struijk (Aalborg University, Denmark)
- 09:30 **Filtering Heart Related Activity from Vagus Nerve Recordings in Rats**
Gael de Lannoy (Université catholique de Louvain, Belgium); Jorge Marin (Université Catholique de Louvain, Belgium); Michel Verleysen (Université Catholique de Louvain, Belgium); Jean Delbeke (Université catholique de Louvain, Belgium)
- 09:45 **A hybrid stimulation artifact reduction scheme for micro-fabricated deep brain stimulation and recording probes**
Thi Kim Thoa Nguyen (IMEC, Belgium); Wolfgang Eberle (IMEC, Belgium); Silke Musa (IMEC, Belgium); Jeroen Lammertyn (KULeuven, Belgium); Carmen Bartic (IMEC, Belgium)
- 10:00 **New sacral neurostimulation strategy to enhance micturition in paraplegics**
Faycal Mounaim (Ecole Polytechnique de Montreal, Canada); Ehab Elzayat (McGill University, Canada); Mohamad Sawan (École Polytechnique de Montréal, Canada); Jacques Corcos (McGill University, Canada); Mostafa Elhilali (McGill University, Canada)
- 10:15 **Towards bladder function modeling : FES induced detrusor activity modeling**
Jeremy Laforet (Universite montpellier 2, France); David Guiraud (INRIA, France); Christine Azevedo-Coste (DEMAR Inria/Lirimm, France); David Andreu (University of Montpellier 2, France)

10:30 - 11:00 Coffee Break

S2: Oral Session 2

11:00 - 12:00 FES for Upper Limb I

Session Chairs:

Thierry Keller (Institute for Biorobotics, Spain)
Jane Burridge (University of Southampton, United Kingdom)

- 11:00 **Toronto Rehabilitation Institute Hand Function Test: Unilateral Gross Motor Function Assessment**
Mary Nagai (Toronto Rehabilitation Hospital Lyndhurst Site, Canada); Christy Contway (University of Toronto, Canada); Vera Zivanovic (Toronto Rehabilitation Hospital Lyndhurst Site, Canada); Kathy Boschen (Toronto Rehabilitation Hospital Lyndhurst Site, Canada); Milos Popovic (University of Toronto, Canada)
- 11:15 **Study of Kinematical Synergy of the Arm Joints for FES Control of Reaching Movements in a Plane**
Ali Maleki (Amirkabir University of Technology, Iran); Ali Fallah (Amirkabir University of Technology, Iran)

- 11:30 **Clinical trial of Myoelectrically controlled FES (MeCFES) for assisting hand function in subjects with tetraplegia –A study of user population, orthotic effect and ADL use.**
Rune Thorsen (Fondazione Don Gnocchi, IRCCS, Italy); Ettore Beghi (Laboratory of Neurological Disorders, Istituto Mario Negri, Milano, Italy, Italy); Sara Chiaramonte (Spinal Unit, Ospedale Niguarda Ca' Granda, Milano, Italy, Italy); Luca Binda (Spinal Unit, Ospedale Morelli, Sondalo, Italy, Italy); Davide dalla Costa (Spinal Unit, Ospedale Niguarda Ca' Granda, Milano, Italy, Italy); Rosa Maria Converti (FDG, Italy); Eugenio Occhi (Spinal Unit, Ospedale Morelli, Sondalo, Italy, Italy); Tiziana Redaelli (Spinal Unit, Ospedale Niguarda Ca' Granda, Milano, Italy, Italy); Maurizio Ferrarin (Fond. Don Carlo Gnocchi Onlus, Italy)
- 11:45 **Upper Limb Outcomes in Stroke Subjects following Neuroprosthetic Functional Electrical Therapy Vs a Graded Arm Exercise Program**
Maura Whittaker (GF Strong Rehab Centre, Canada)
- 12:00 **Clinical effectiveness and participant perceptions of an implanted closed-loop neurostimulator-sensor system for arm rehabilitation post-stroke**
Ruth Turk (University of Southampton, United Kingdom); Jane Burrige (University of Southampton, United Kingdom); Daniel Merrill (Alfred E. Mann Foundation, USA); Gregoire Cosendai (Alfred E. Mann Foundation, Switzerland); Anne-Marie Hughes (University of Southampton, United Kingdom); Joe Schulman (Alfred E. Mann Foundation, USA)
- 12:15 **Feasibility study of an implanted FES device for hand opening following stroke**
Julie Esnouf (National Clinical FES Centre, United Kingdom); Geraldine Mann (Dept. Clinical Science and Engineering, United Kingdom); Rod Lane (National Clinical FES Centre, United Kingdom); Thanh Dao (Finetech Mewdical Limited, United Kingdom)

12:30 - 13:30 Lunch Break

S3: Oral Session 3

13:30 - 14:45 FES for Upper Limb II

Session Chairs:

Ruediger Rupp (Orthopaedic University Hospital, Germany)

Paul Taylor (University of Bournemouth, Salisbury District Hospital, United Kingdom)

13:30 **Assessment of a User Command Controller for People with High Level Tetraplegia to Control a Full Upper Limb Neuroprosthesis In Five Degrees of Freedom**
Timothy Scott (Royal North Shore Hospital, Australia); Veronica Vare (Royal North Shore Hospital, Australia)

13:45 **Evaluation of control methods for grasp neuroprostheses based on residual movements, myoelectrical activity and cortical signals**
Ruediger Rupp (Orthopaedic University Hospital, Germany); Gernot Müller-Putz (Graz University of Technology, Austria); Gert Pfurtscheller (Graz University of Technology, BCI-Lab, Austria); Hans Jürgen Gerner (Stiftung Orthopädische Universitätsklinik Heidelberg, Germany); Gerhard Vossius (University of Karlsruhe, Germany)

14:00 **A Feasibility Study to assess the effect of Accelerometer Triggered Electrical Stimulation on Recovery of Upper Limb function in Chronic Stroke Patients**
Geraldine Mann (Dept. Clinical Science and Engineering, United Kingdom); Paul Taylor (University of Bournemouth, Salisbury District Hospital, United Kingdom); Rod Lane (National Clinical FES Centre, United Kingdom)

14:15 **Application of local EMG-Driven Electrical Stimulation to paretic shoulder muscle of the proximal dominant hemiplegics**
Kazunori Seki (Tohoku University Graduate School of medicine, Japan)

14:30 **Optimized electrode placement and improved EMG detection for a new textile grasping neuroprosthesis**
Marc Lawrence (ETH Zurich, Switzerland); Samuel Monteleone (ETH Zurich, Switzerland); Thierry Keller (Institute for Biorobotics, Spain); Silvestro Micera (Institute for Biorobotics, Italy)

P1: Poster Session 1
14:45 - 15:45 FES for Upper and Lower Limb, Bladder Control

Coffee

Sacral surface electrical stimulation can control the contraction of prostatic smooth muscle
Chie Hirayama (University of Tohoku, Japan)

Therapeutic effect of MeCFES Assisted Finger Extension on the Hand of Hemiparetic Subjects

Rune Thorsen (Fondazione Don Gnocchi, IRCCS, Italy); Marco Cortesi (Rehabilitation Unit, Milano - Fond. Don Carlo Gnocchi Onlus., Italy); Johanna Jonsdottir (Rehabilitation Unit, Milano - Fond. Don Carlo Gnocchi Onlus, Italy, Italy); Manuela Divverio (Rehabilitation Unit, Sarzana - Fond. Don Carlo Gnocchi Onlus., Italy); Rosa Maria Converti (FDG, Italy); Ilaria Carpinella (Biomedical Technology Department - Fond. Don Carlo Gnocchi Onlus., Italy); Anna Casiraghi (FDG, Italy); Martina Puglia (Rehabilitation Unit, Sarzana - Fond. Don Carlo Gnocchi Onlus., Italy); Maura Casadio (University of Genoa, Italy); Paolo Mazzoleni (Biomedical Technology Department - Fond. Don Carlo Gnocchi Onlus., Italy); Daniela Morelli (Rehabilitation Unit, Milano - Fond. Don Carlo Gnocchi Onlus., Italy); Maurizio Ferrarin (Fond. Don Carlo Gnocchi Onlus, Italy)

From mind to movement – Contralateral EMG-triggered Electrical Stimulation for Bilateral Movements in Hemiparetic Patients

Carmen Krewer (Neurologische Klinik Bad Aibling, Germany); Christopher Sikorski (Neurologische Klinik Bad Aibling, Germany); Christian Blechschmidt (Neurologische Klinik Bad Aibling, Germany); Friedemann Müller (Neurologische Klinik Bad Aibling, Germany); Jochen Quintern (Neurologische Klinik Bad Aibling, Germany)

Preliminary Evaluation for a Functional Support of the Elbow and Shoulder Joint
Christian Pylatiuk (Forschungszentrum Karlsruhe, Germany)

An Evaluation of Hemiplegic Upper Extremity Coordination by A Robotic Support System to Reconstruct The Reaching Movement Using Functional Electrical Stimulation

Satoaki Chida (Akita University Hospital, Japan)

Continuous-Time Control of Spring Brake Orthotic Swing Phase

M Saiful Huq (University of Sheffield, United Kingdom); Babul Salam Kader Ibrahim (University of Sheffield, United Kingdom); M. Tokhi (University of Sheffield, United Kingdom)

Muscle Activation Response to Electrical Stimulation for Motor Complete SCI following a Stand Retraining and Functional Electrical Stimulation Intervention: A Case Study.

Gail Forrest (KMRREC, USA); Pourn Faghri (University of Connecticut and Community Medicine (School of Medicine, USA); Mathew Yarossi (KMRREC, USA); Steven Kirshblum (Kessler Institute for Rehabilitation, USA); Erica Garbarini (KMRREC, USA); Sue Ann Sisto (KMRREC, USA); Susan Harkema (University of Louisville, USA)

Clinical long-term follow up of FES for correction of foot drop: a case report

Takenori Tomite (Akita University, Japan)

Measurement of relative joint angle and acceleration of the lower limb during walking

Noreha Abdul Malik (University of Southampton, United Kingdom); Paul Chappell (University of Southampton, United Kingdom); Duncan Wood (Salisbury District Hospital, United Kingdom); Paul Taylor (University of Bournemouth, Salisbury District Hospital, United Kingdom)

Evaluation of electrical stimulation of gait and posture in elderly people

Kazutoshi Hatakeyama (Akita University, Japan)

Detection of Gait Phases with Piezoelectric Gyroscope under Different Walking Speed Conditions

Norio Furuse (Miyagi National College of Technology, Japan)

Gait Event Detection using Tilt Sensor for Portable FES System

RyangHee Sohn (Yonsei University, Korea)

S4: Oral Session 4

15:45 - 17:00 FES for Lower Limb

Session Chairs:

Andy Hoffer (Simon Fraser University, Canada)

Manfred Bijak (Medical University of Vienna, Austria)

15:45

The Control Strategy of FES Using Accelerometers in Standing Balance Training

Shih Wei Chen (National Taiwan University, Taiwan); Shih Ching Chen (Taipei Medical University and Hospital, Taiwan); Chiun Fan Chen (National Taiwan University, Taiwan); Jin-Shin Lai (National Taiwan University, Taiwan); Te Son Kuo (National Taiwan University, Taiwan)

16:00

The Interaction of Paired Associative Stimulation and repetitive Electrical Stimulation

Natalie Mrachacz-Kersting (Aalborg University, Denmark); Thomas Sinkjær (Aalborg University, Denmark)

- 16:15 **Modulation of stimulation frequency of afferents of the spinal cord from the same site and intensity can induce a variety of movements**
Winfried Mayr (Medical University of Vienna, Austria); Christian Hofer (Ludwig Boltzmann Institute of Electrical Stimulation and Physical Rehabilitation, Austria); Karen Minassian (Vienna University of Technology, Austria); Ursula Hofstoetter (Vienna University of Technology, Austria); Helmut Kern (Wilhelminenspital Wien, Austria); Manfred Bijak (Medical University of Vienna, Austria); Ewald Unger (Medical University of Vienna, Austria); Frank Rattay (Vienna University of Technology, Austria); Milan Dimitrijevic (Baylor College of Medicine, USA)
- 16:30 **Effect of neuro-muscular electrical stimulation on tibialis anterior in children with cerebral palsy.**
Carla De Conti ("E.Medea" research institute, Conegliano, Italy); Enrico Trevisi (E. Medea Scientific Center, Conegliano Research Institute, Italy); Annamaria Salghetti (E. Medea Scientific Institute, Conegliano Research Center, Italy)
- 16:45 **Estimation of Nerve Dimensions from MRI of the Human Thigh**
Andy Hoffer (Simon Fraser University, Canada); Faisal Beg (Simon Fraser University, Canada); Eli Gibson (Simon Fraser University, Canada); Burkhard Madler (University of British Columbia, Canada)

P2: Poster Session 2
17:00 - 18:00 Neuromodulation, Modelling & Control

Coffee

Epidural stimulation of the motor cortex for neuropathic pain: future directions

Thomas Reithmeier (University of Freiburg, Germany); Marcus Pinsker (University of Freiburg, Germany); Tobias Piroth (University of Freiburg, Germany); Michael Trippel (University of Freiburg, Germany); Thomas Prokop (University of Freiburg, Germany); Guido Nikkhah (University of Freiburg, Germany)

Application of Pulsed Radio Frequency to the dorsal horn and dorsal roots

Omar Omar-Pasha (Maria-Stern-Hospital, Germany)

Striatal microstimulation in awake animals depends on NMDA receptor activity

Susanne Loeffler (University of Luebeck, Germany); Simon Vogt (University of Luebeck, Germany); Ulrich Hofmann (University of Luebeck, Germany); Andreas Moser (University of Luebeck, Germany)

Electrical hippocampus stimulation for treatment of epilepsy

Andreas Schulze-Bonhage (University Hospital Freiburg, Germany); Michael Trippel (University of Freiburg, Germany); Joacir Cordeiro (University Hospital Freiburg, Germany); Dirk-Matthias Altenmueller (University Hospital Freiburg, Germany); Kathrin Wagner (University Hospital Freiburg, Germany); Guido Nikkhah (University of Freiburg, Germany)

Evaluation of low frequency stimulation in fully kindled rats

Joacir Cordeiro (University Hospital Freiburg, Germany); Karina Kohn Cordeiro (University Hospital Freiburg, Germany); Alberto Capurro (University Hospital Freiburg, Germany); Ad Aertsen (Universität Freiburg, Germany); Andreas Schulze-Bonhage (University Hospital Freiburg, Germany)

Optimally spaced stimulation for clinical use with FES -its effect on spinal reflexes & muscle activation

Darren Hart (University of Southampton, United Kingdom); Duncan Wood (Salisbury District Hospital, United Kingdom); Paul Taylor (University of Bournemouth, Salisbury District Hospital, United Kingdom); Paul Chappell (University of Southampton, United Kingdom)

Bilateral Teleoperator System of Robot with Force Reflection using Functional Electrical Stimulation

Takehiro Iwami (Akita University, Japan)

On the Use of Adaptive Control in Stimulation-Assisted Neuromotor Therapy

James Abbas (Arizona State University, USA) , Seung-Jae Kim (Arizona State University, USA) , Mallika Fairchild (Arizona State University, USA) , Shelly Allison (Arizona State University, USA) , Narayanan Krishnamurthi (Arizona State University, USA) , Ranu Jung (Arizona State University, USA)

Adaptive Neuro-Sliding Mode Control of FES-Cycling

Khashayar Misaghian (Iran University of Science and Technology, Iran); Abbas Erfanian (Iran University of Science and Technology, Iran)

FES Adaptive Feedback Control using Neural networks with PID

Raymond Kai-yu Tong (The Hong Kong Polytechnic University, Hong Kong)

Elliptical FES Stepping: Effect of Varying Stimulation Angles

Nur Azah Hamzaid (The University of Sydney, Australia); Che Fornusek (The University of Sydney, Australia); Richard Smith (The University of Sydney, Australia); Glen Davis (The University of Sydney, Australia)

A New FES-Based Fuzzy Logic Control Strategy Aiming to Support Standing in Paraplegia

Ciprian Stefan (Technical University "Gh. Asachi" of Iasi, Romania); Marian Poboroniuc (Technical University "Gh. Asachi" of Iasi, Faculty of Electrical Engineering, Romania); Gheorghe Livint (Technical University "Gh. Asachi" of Iasi, Faculty of Electrical Engineering, Romania); Danut Irimia (Technical University "Gh. Asachi" of Iasi, Faculty of Electrical Engineering, Romania)

Adaptive Neuro-Sliding Mode Control of Ankle Movement Using Electrical Stimulation of Agonist-Antagonist Muscles

Hamid_Reza Kobravi (Iran University of Science and Technology, Iran); Abbas Erfanian (Iran University of Science and Technology, Iran)

A simple biomechanical model of the trunk for FES assisted balance control in paraplegia

Michele Vanoncini (University of Reading, United Kingdom); William Holderbaum (School of System Engineering, United Kingdom); Brian Andrews (Oxford Brookes University, United Kingdom)

A Preliminary Test of Modified Applying Methods of Feedback Error Learning for FES Control

Takashi Watanabe (Tohoku University, Japan)

Control Strategies Adopted by Elite FES Rowers

Sina Sareh (Oxford Brookes University, United Kingdom); Brian Andrews (Oxford Brookes University, United Kingdom); Matthew Green (Oxford Brookes University, United Kingdom); Adrian Poulton (ICT Department, United Kingdom)

Emulobody: a mechatronic device to test FES-based standing control strategies in paraplegia

Marian Poboroniuc (Technical University "Gh. Asachi" of Iasi, Faculty of Electrical Engineering, Romania); Ciprian Stefan (Technical University "Gh. Asachi" of Iasi, Romania)

18:00 - 19:00 Meeting of the Upper Limb Assessment Group
Co-Chaired by Roger Nathan and Catherine Lang

19:00 - 20:00 Opening Ceremony
Honorary Lecture

20:00 - 22:00 Get Together
Industrial Exhibition

Tuesday, September 23, 2008

08:15 - 09:00 KN2: Keynote Lecture 2
Inference of hand movements from population activity in monkey and human sensorimotor cortex: Towards Brain-Machine Interfaces
Ad Aertsen (University of Freiburg, Germany)

In monkeys, activity of multiple single neurons related to arm movement can be employed to control an external actuator. Based on this work, there is an increasing interest in designing implantable brain-machine interfaces (BMI), enabling real-time control of neuroprosthetic devices. Such movement inference has recently been demonstrated in humans, but little is yet known about the possibility to decode information for the control of reaching and grasping from different sensorimotor areas activated by hand movements. Evidently, specificity and long-term stability of the recorded signals is essential for successful brain-machine interface applications. Thus, a promising novel approach for robust neuro-interfacing is based on neuronal population activity, instead of multiple single neuron activity. Earlier, we demonstrated that local field potentials from monkey primary motor cortex can be as efficient as single neuron activity for decoding arm movements^{1,2}. I will give an overview of these results and present more recent findings³⁻⁷, aimed at studying the feasibility of inferring hand movements in humans from single-trial population :

09:00 - 10:45 S5: Oral Session 5
Brain Computer Interfaces + Invited Talk by J.R. Wolpaw
Session Chairs:
Jonathan Wolpaw (Wadsworth Center, USA)
Ad Aertsen (Universität Freiburg, Germany)

09:00 **Brain-Computer Interface (BCI) Research and Development at the Wadsworth Center**
Jonathan Wolpaw (Wadsworth Center, USA)

09:30 **Development of a neuronal motor prosthesis for the restoration of movement in paralyzed people**
Jörn Rickert (Uni Freiburg, Germany)

09:45 **Performance and control error related neuronal signals in human ECoG recordings**
Tomislav Milekovic (University of Freiburg, Germany)

10:00 **Discriminating sounds from the human electrocorticogram for braincomputer**
Chloé Huetz (University Freiburg, Germany)

10:15 **Development and Testing of Non-Invasive BCI + FES/Robot System For Use in Motor Re-Learning After Stroke**

Janis Daly (Case Western Reserve University School of Medicine, USA); Roger Cheng (Department of Veterans Affairs, USA); Kenneth Hrovat (Department of Veterans Affairs, USA); Krisanne Litinas (Department of Veterans Affairs, USA); Jean Rogers (Department of Veterans Affairs, USA); Mark Dohring (Department of Veterans Affairs, USA)

10:30 **Real time decoding of hand grasping signals from macaque pre-motor and parietal cortex**
Benjamin Townsend (Uni | ETH Zurich, Switzerland); Erk Subasi (Institute of Neuroinformatics, Switzerland); Hansjörg Scherberger (Uni | ETH Zurich, Switzerland)

10:45 - 11:15 Coffee Break

S6: Oral Session 6

11:15 - 12:45 Vision & Auditory Neuroprostheses

Session Chairs:

Gregg Suaning (University of New South Wales, Australia)
Phil Troyk (Illinois Institute of Technology, USA)

11:15 **Physiologically inspired coding strategies for cochlear implants**
Andreas Bahmer (University of Frankfurt, Germany); Uwe Baumann (University of Frankfurt, Germany); Gerald Langner (Technical University Darmstadt, Germany)

11:30 **Determining the Feasibility of an Intracortical Visual Prosthesis**
Phil Troyk (Illinois Institute of Technology, USA)

11:45 **Functional Stimulation in Visual Neuroprostheses**
Samuel Romero (University of Jaen, Spain); Christian Morillas (University of Granada, Spain); Francisco Pelayo (University of Granada, Spain); Eduardo Fernández (University Miguel Hernández, Spain)

12:00 **Visual Sensations Mediated By Subretinal Microelectrode Arrays Implanted Into Blind Retinitis Pigmentosa Patients**
Eberhart Zrenner (University of Tübingen, Germany)

12:15 **Performance of a next generation active subretinal chip**

Alex Harscher (Retina Implant, Germany); Steffen Kibbel (Retina Implant AG, Germany)

12:30 **Hermetic Encapsulation of an Implantable Vision Prosthesis - Combining Implant Fabrication Philosophies**
Anne Vanhoestenbergh (University College London, United Kingdom); Nick Donaldson (University College London, United Kingdom); Nigel Lovell (UNSW, Australia); Gregg Suaning (University of New South Wales, Australia)

12:45 - 13:45 Lunch Break

S7: Oral Session 7

13:45 - 15:15 Neural Interfaces

Session Chairs:

Patrick Ruther (University of Freiburg, Germany)

Nick Donaldson (University College London, United Kingdom)

13:45

Electrochemical characterisation of laser-opened electrode contacts of implantable neuroprostheses

Christian Henle (Universität Freiburg, Germany); Martin Schuettler (University of Freiburg, Germany); Mark Keller (Universität Freiburg, Germany); Thomas Stieglitz (University of Freiburg, Germany)

14:00

A Flexible 29 Channel Epicortical Electrode Array

Martin Schuettler (University of Freiburg, Germany); Juan Ordonez (University of Freiburg, Germany); Christian Henle (Universität Freiburg, Germany); Dongin Oh (University College London, United Kingdom); Ori Gilad (University College London, United Kingdom); David Holder (University College London, United Kingdom)

14:15

Towards high aspect ratio tungsten Micro Electrode Array for neural recording and stimulation applications

Prashant Tathireddy (University of Utah, USA); Selim Krummenacker (Fraunhofer IBMT, Germany); Sascha Kammer (Fraunhofer-Institut für Biomedizinische Technik IBMT, Germany); Klaus Hoffmann (Fraunhofer Institut für Biomedizinische Technik, Germany); Florian Solzbacher (University of Utah, USA)

14:30

The NeuroProbes Project – Multifunctional Probe Arrays for Neural Recording and Stimulation

Patrick Ruther (University of Freiburg, Germany); Arno Aarts (Interuniversity Microelectronics Centre (IMEC), Belgium); Olivier Frey (Institute of Microtechnology (IMT), University of Neuchâtel, Switzerland); Stanislav Herwik (University of Freiburg, Germany); Sebastian Kisban (University of Freiburg, Germany); Karsten Seidl (University of Freiburg, Germany); Sven Spieth (Hahn-Schickard-Gesellschaft, Germany); Axel Schumacher (HSG-IMIT, Germany); Milena Koudelka-Hep (University of Neuchatel, Switzerland); Oliver Paul (IMTEK, Germany); Thomas Stieglitz (University of Freiburg, Germany); Roland Zengerle (IMTEK Freiburg, Germany); Hercules Neves (Interuniversity Microelectronics Centre (IMEC), Belgium)

14:45

A new integrated optical and electrophysiological sensor

David Krapohl (University of Applied Sciences Aachen, Germany); Ulrich Hofmann (University of Luebeck, Germany); Kunal Mankodiya (University of Luebeck, Germany)

15:00

Development of the first actuated intraneural electrode

Bossi (Scuola Superiore Sant'Anna, Pisa, Italy); Sascha Kammer (Fraunhofer-Institut für Biomedizinische Technik IBMT, Germany); Thomas Doerge (IBMT, Germany); Arianna Menciassi (Scuola Superiore Sant'Anna, Italy); Klaus-Peter Hoffmann (IBMT, Germany); Silvestro Micera (Institute for Biorobotics, Italy)

P3: Poster Session 3

15:15 - 16:15 FES for Exercise, Denervated Muscles & Stroke

Coffee

Gain-Scheduled EMG-Controlled Electrical Stimulation

Raafat Shalaby (Technische Universität Berlin, Germany); Thomas Schauer (Technische Universität Berlin, Germany); Holger Nahrstaedt (Technische Universität Berlin, Germany)

Effect of intensive functional electrical stimulation therapy on the upper limb motor recovery after stroke

Noritaka Kawashima (University of Toronto, Canada); Milos Popovic (University of Toronto, Canada)

Application of accelerometer and gyroscope in FES assisted walking for the correction of drop foot

Toshiki Matsunaga (Akita University Hospital, Japan)

Integration between fMRI and motion capture system to evaluate changes in cortical activations after rehabilitation in hemiplegic patients

Nicola Volonterio (Politecnico di Milano, Italy); Simona Ferrante (Politecnico di Milano, Italy); Claudia Casellato (Politecnico di Milano, Italy); Alessandra Pedrocchi (Politecnico di Milano, Italy); Franco Molteni (Valduce Hospital, Villa Beretta Rehabilitation Center, Italy); Giancarlo Ferrigno (Politecnico di Milano, Italy); Giuseppe Baselli (Politecnico di Milano, Italy); Alberto Martegani (Valduce Hospital, Italy); Tiziano Frattini (Valduce Hospital, Italy)

Muscle and Bone changes in Denervated and Degenerated Muscles Treated with Electrical Stimulation

Thordur Helgason (Landspítali - University Hospital, Iceland)

Energy-Efficient FES Cycling with Quadriceps Stimulation

Babul Salam Kader Ibrahim (University of Sheffield, United Kingdom); Samad Gharooni (University of Sheffield, United Kingdom); M. Tokhi (University of Sheffield, United Kingdom); Rasha Massoud (University of Sheffield, United Kingdom)

Trainings- and Measurement- System for FES- Cycling

Werner Reichenfelser (Vienna University of Technology, Austria); Harald Hackl (Technical University Vienna, Austria); Stefan Mina (ARC GmbH, Austria); Sten Hanke (ARC GmbH, Austria); Peter Lugner (Technical University Vienna, Austria); Margit Gföhler (Technical University Vienna, Austria)

Electrical muscle stimulation can be used to elicit incremental cardiovascular exercise response and subjective effort without undue discomfort in adult subjects.

Domenico Crognale (University college Dublin, Ireland); Jean Francois Grosset (University College Dublin, Ireland); Louis Crowe (University College Dublin, Ireland); Conor Minogue (Bio-medical Research (BMR) Ltd., Ireland); Giuseppe DeVito (University College Dublin, Ireland); Brian Caulfield (University College Dublin, Ireland)

The Metabolic Efficiency of FES cycling

Lynsey Duffell (Kings College London, United Kingdom); Nick Donaldson (University College London, United Kingdom); Di Newham (Kings College London, United Kingdom)

Stimulation of shank muscles during FES cycling to maximize ankle movement

Che Fornusek (The University of Sydney, Australia); Nur Azah Hamzaid (The University of Sydney, Australia)

S8: Oral Session 8**16:15 - 17:45 Neural Recording & Stimulation****Session Chairs:**

Klaus Peter Koch (University of Applied Science Darmstadt, Germany)

Maurits Ortmanns (University of Ulm, Germany)

16:15 Selective Activation of Pig Forearm Muscles using Thin-Film Intrafascicular Electrodes Implanted in the Median Nerve

Mathijs Kurstjens (Aalborg University, Denmark); Winnie Jensen (Aalborg University, Denmark); Ken Yoshida (Indiana University – Purdue University Indianapolis, USA)

16:30 Multi-scale and higher order statistical analyses of intrafascicular nerve recordings

Mastaneh Torkamani Azar (Indiana University Purdue University Indianapolis, USA); Ernest Kamavuako (Aalborg University, Denmark); Paul Salama (Indiana University Purdue University Indianapolis, USA); Ken Yoshida (Indiana University – Purdue University Indianapolis, USA)

16:45 Classification of afferent signals from single channel cuff neural electrodes

Stanisa Raspopovic (Scuola Superiore Sant Anna, Italy)

17:00 A Reconfigurable and Automated System for the Study of Stimulus Waveform Parameters

Virginia Woods (Imperial College London, United Kingdom); Iasonas Triantis (Imperial College London, United Kingdom); Christofer Toumazou (Imperial College London, United Kingdom)

17:15 In vitro evaluation of a high-frequency current-switching stimulation technique for FES applications

Xiao Liu (University College London, United Kingdom); Andreas Demosthenous (University College London, United Kingdom); Anne Vanhoostenberghe (University College London, United Kingdom); Nick Donaldson (University College London, United Kingdom)

17:30 iSANLA: intelligent Sensor and Actuator Network for Life Science Applications

Michael Schiek (Forschungszentrum Jülich, Germany); Mario Schlösser (Forschungszentrum Jülich, Germany); Andreas Schnitzer (Forschungszentrum Jülich, Germany); Carmen Silex (Forschungszentrum Jülich GmbH, Germany); Hong Ying (Forschungszentrum Jülich, Germany)

P4: Poster Session 4**17:45 - 18:45 Brain Computer Interfaces & Neural Technology****Coffee****Wavelet-Based Spike Sorting of Muscle Spindle Afferent Nerve Activity Recorded With Thin-Film Intrafascicular Electrodes**

Milan Djilas (INRIA, France); Christine Azevedo-Coste (DEMAR Inria/Lirmm, France); David Guiraud (INRIA, France); Jerome Bourien (University of Montpellier1 - Inserm U583, France); Ken Yoshida (Indiana University – Purdue University Indianapolis, USA)

Tactile Discrimination Based on Intracortical Microstimulation in Primary Somatosensory Cortex in Sprague-Dawley Rats

Winnie Jensen (Aalborg University, Denmark); Patrick Rousche (University of Illinois at Chicago, USA)

Electrooculography-based Human Interface for Robot Controlling

Eduardo Láñez (University Miguel Hernández, Spain); Jose Azorin (Universidad Miguel Hernandez de Elche, Spain); Eduardo Fernández (University Miguel Hernández, Spain); Ricardo Morales (University Miguel Hernández, Spain)

EEG-based brain computer interface(BCI) controlled functional electrical stimulation (FES) therapy for stroke rehabilitation

Raymond Kai-yu Tong (The Hong Kong Polytechnic University, Hong Kong)

ECoG Controlled Neuroprosthesis for Grasping: Preliminary Study

Cesar Márquez-Chin (Rehabilitation Engineering Laboratory, University of Toronto, Canada); Tracy Cameron (Toronto Western Hospital Research Institute, Canada); Andres Lozano (Toronto Western Hospital Research Institute, Canada); Robert Chen (Toronto Western Hospital Research Institute, Canada); Milos Popovic (University of Toronto, Canada)

An Interactive Virtual Reality based BCI for On-line Control of Hand Grasping, Opening, and Holding: Feature Selection by Mutual Information

Abbas Erfanian (Iran University of Science and Technology, Iran); Navid Hamed (Iran University of Science and Technology, Iran)

A step towards discretized motion control of the upper limb using EEG-based brain-computer interface and electrical stimulation

Adrian Tan (Nanyang Technological University, Singapore); Dingguo Zhang (Lirmm, France)

Optimization of microporous platinum coatings for neural micro-electrodes

Wigand Poppendieck (Fraunhofer Institute for Biomedical Engineering, Germany); Thomas Dörge (Fraunhofer Institute for Biomedical Engineering, Germany); Klaus Hoffmann (Fraunhofer Institut für Biomedizinische Technik, Germany)

Five valuable functions of blocking capacitors in stimulators

Xiao Liu (University College London, United Kingdom); Andreas Demosthenous (University College London, United Kingdom); Nick Donaldson (University College London, United Kingdom)

An Experimental Study on Passive Charge Balancing

Kriangkrai Sooksood (University of Ulm, Germany); Thomas Stieglitz (University of Freiburg, Germany); Maurits Ortmanns (University of Ulm, Germany)

Challenges facing packaging of small scale biomedical implants

Nooshin Saeidi (University College London, United Kingdom); Andreas Demosthenous (University College London, United Kingdom); Nick Donaldson (University College London, United Kingdom); John Alderman (Tyndall National Institute, Ireland)

The 3D potential induced by functional electrical stimulation with multi-contact cuff electrodes: simulation and validation.

Maureen Clerc (Ecole Nationale des Ponts et Chaussées, France); Romain Veltz (INRIA and MXM, France); David Guiraud (INRIA, France); Jean-Louis Divoux (MXM company, France)

A New Intramuscular Electrode for Functional Electrical Stimulation in the Rat

Mary Nagai (Toronto Rehabilitation Hospital Lyndhurst Site, Canada); Abdulkadir Bulsen (Toronto Rehabilitation Hospital Lyndhurst Site, Canada); Abdolazim Rashidi (Toronto Rehabilitation Hospital Lyndhurst Site, Canada); Marina Erenshteyn (A.I duPont Hospital for Children, USA); Milos Popovic (University of Toronto, Canada)

First human intra-operative testing of the Stimulus Router System

Arthur Prochazka (University of Alberta, Canada); Liu Shi Gan (University of Alberta, Canada); Jaret Olson (University of Alberta, Canada); Michael Morhart (University of Alberta, Canada)

19:00 **IFESS Board of Directors Meeting**

Wednesday, September 24, 2008

KN3: Keynote Lecture 3

08:15 - 08:45 **Ethical and Societal Implications of Central Nervous System Neuroprostheses**

Steffen Rosahl (HELIOS Kliniken GmbH, Germany)

The ethical principles for research, development and clinical application of neural prosthesis and neural implants should not differ from those for other medical devices or pharmaceutical agents as long as the prosthesis restores lost function or modulates disturb function in the central nervous system. In other words, as long as treatment is concerned, careful risk - side effects - benefit assessment and informed consent of the patient will safely guide our endeavours. Availability of neural prosthesis, i.e. the ability and willingness of health insurance providers to support implants will probably become more important with increasing clinical indications. "Enhancement", i.e. the extension of human capabilities beyond the normal range with neural implants does not play a role in today's applications but its potential and often reiterated public fears require an informed public debate that will bring issues of social importance like personal identity and the self-understanding of human beings to the foreground.

S9: Oral Session 9

09:00 - 10:45 **FES for Exercise**

Session Chairs:

Glen Davis (The University of Sydney, Australia)

Brian Andrews (Oxford Brookes University, United Kingdom)

09:00 **FESAiR: Integration of Functional Electrical Stimulation with Physiotherapy Clinical Practice: 2008 Report**

Maura Whittaker (GF Strong Rehab Centre, Canada)

09:15 **The Effects of Subcutaneous Fat, Electrode Size and Inter-Electrode Distance During Transcutaneous Electrical Stimulation**

Emer Doheny (University College Dublin, Ireland); Brian Caulfield (University College Dublin, Ireland); Conor Minogue (Bio-medical Research (BMR) Ltd., Ireland); Madeleine Lowery (University College Dublin, Ireland)

09:30 **Electrical muscle stimulation can be used to elicit cardiovascular exercise response at training intensities in obese adults**

Jean Francois Grosset (University College Dublin, Ireland); Donal O'Shea (St Vincent's University Hospital, Ireland); Louis Crowe (University College Dublin, Ireland); Conor Minogue (Bio-medical Research (BMR) Ltd., Ireland); Brian Caulfield (University College Dublin, Ireland)

09:45 **FES-supported interval training following sensorimotor-complete spinal cord injury: a case series.**
Jack Crosbie (University of Sydney, Australia); Michael Russold (Otto Bock Healthcare Products GmbH, Austria); Jacqui Raymond (University of Sydney, Australia); James Middleton (University of Sydney, Australia); Glen Davis (The University of Sydney, Australia)

10:00 **Cardiovascular Effects of FES and Passive Stepping on Orthostatic Hypotension**
Lorne Chi (University of Toronto, Canada); Kei Masani (University of Toronto, Canada); Masae Miyatani (University of Toronto, Canada); T. Adam Thrasher (University of Houston, USA); K. Wayne Johnston (University of Toronto, Canada); Alexandra Mardimae (University of Toronto, Canada); Joseph Fisher (University of Toronto, Canada); Milos Popovic (University of Toronto, Canada); Cathie Kessler (Thornhill Research Inc, Canada)

10:15 **Changes in superficial pressure and tissue oxygenation levels due to contractions elicited by intermittent electrical stimulation for the prevention of deep tissue injury**
Leandro Solis (University of ALberta, Canada)

10:30 **The effect of different types of chronic electrical stimulation training on muscle contractile and histological properties: A pilot study.**
Lynsey Duffell (Kings College London, United Kingdom); Anthea Rowleron (Kings College London, United Kingdom); Nick Donaldson (University College London, United Kingdom); Di Newham (Kings College London, United Kingdom)

10:45 - 11:15 Coffee Break

S10: Oral Session 10

11:15 - 12:45 FES Cycling

Session Chairs:

Rik Berkelmanns (Nijmegen, The Netherlands)
Simona Ferrante (Politecnico di Milano, Italy)

11:15 **First experiences in Hometraining with FES cycling**
Derek Jones (Anatomical Concepts (UK) Ltd, United Kingdom); Andrea Weber (Employee, Germany)

11:30 **The use of functional electrical stimulation assisted cycling in adolescents with cerebral palsy**
Ann Tokay (University of Delaware, USA); Calum McRae (Shriners Hospitals for Children, Philadelphia, USA); Therese Johnston (Shriners Hospitals for Children, Philadelphia, USA); Samuel Lee (Shriners Hospital for Children, USA)

11:45 **Design of a symmetry controller for FES cycling - Preliminary results on post-acute stroke patients**

Emilia Ambrosini (Politecnico di Milano, Italy); Simona Ferrante (Politecnico di Milano, Italy); Thomas Schauer (Technische Universität Berlin, Germany); Alessandra Pedrocchi (Politecnico di Milano, Italy); Giancarlo Ferrigno (Politecnico di Milano, Italy); Franco Molteni (Valduce Hospital, Villa Beretta Rehabilitation Center, Italy)

12:00 **Work Efficiency and Stimulation Cost during FES-cycling by Children with a Spinal Cord Injury**

Calum McRae (Shriners Hospitals for Children, Philadelphia, USA); Therese Johnston (Shriners Hospitals for Children, Philadelphia, USA); Ken Hunt (Centre for Rehabilitation Engineering, University of Glasgow, United Kingdom); Richard Lauer (Shriners Hospitals for Children, Philadelphia, USA)

12:15 **Cardiorespiratory and Metabolic Responses during FES-Leg Cycling and Hybrid FES-Gait in SCI Individuals**

Glen Davis (The University of Sydney, Australia); Anna Lauffer (University of Sydney, Australia); Jack Crosbie (University of Sydney, Australia); Jacqui Raymond (University of Sydney, Australia); Michael Russold (Otto Bock Healthcare Products GmbH, Austria); Che Fornusek (The University of Sydney, Australia); Gustavo Braz (University of Sydney, Australia); Luciola Menezes (University of Sydney, Australia); James Middleton (University of Sydney, Australia)

12:30 **Potential application of a passive cycling training as a tool for modulating spinal H-reflex pathways in post-acute stroke patients: a feasibility study**

Simona Ferrante (Politecnico di Milano, Italy); Emilia Ambrosini (Politecnico di Milano, Italy); Alessandra Pedrocchi (Politecnico di Milano, Italy); Giancarlo Ferrigno (Politecnico di Milano, Italy); Franco Molteni (Valduce Hospital, Villa Beretta Rehabilitation Center, Italy); Riccardo Mazzocchio (Università di Siena, Italy)

12:45 - 13:30 Lunch Break

13:30 - 18:00 Lab Tours & Excursion
1. IMTEK, Building 102-104
2. University Hospital
3. City Tour

19:00 -22:00 Conference Dinner
Historic Merchant's Hall

Thursday, September 25, 2008

KN4: Keynote Lecture 4

08:30 - 09:00 Biocompatibility of Central Nervous System Probes

Eduardo Fernández (University Miguel Hernández, Spain)

The manner in which a mutually acceptable co-existence of biomaterials and nervous system cells is developed and sustained is essential for long-term neuroprosthetic applications and has been the focus of attention for many years. Microelectrode implantation triggers a large network of morphological and metabolic changes that can be modulated. It is essential to understand the signals that lead to neuroglial activation and create a targeted intervention to control the response, reduce the adverse nature of the reactions and maintain an ideal environment for the brain-electrode interface.

S11: Oral Session 11

09:15 - 10:30 FES for Denervated Muscles

Session Chairs:

Winfried Mayr (Medical University of Vienna, Austria)

Thordur Helgason (Landspítali - University Hospital, Iceland)

09:15 The European R&D project RISE - Use of electrical stimulation to restore standing in paraplegics with long-term denervated degenerated muscles (DDM)

Winfried Mayr (Medical University of Vienna, Austria); Christian Hofer (Ludwig Boltzmann Institute of Electrical Stimulation and Physical Rehabilitation, Austria); Helmut Kern (Wilhelminenspital Wien, Austria); Manfred Bijak (Medical University of Vienna, Austria); Hermann Lanmüller (Medical University of Vienna, Austria); Dietmar Rafolt (Medical University of Vienna, Austria); Hans Stöhr (Medical University of Vienna, Austria); Ewald Unger (Medical University of Vienna, Austria)

09:30 Second generation stimulation equipment for Denervated Muscles in the scope of the EU project RISE

Manfred Bijak (Medical University of Vienna, Austria); Ewald Unger (Medical University of Vienna, Austria); Christian Hofer (Ludwig Boltzmann Institute of Electrical Stimulation and Physical Rehabilitation, Austria); Hermann Lanmüller (Medical University of Vienna, Austria); Dietmar Rafolt (Medical University of Vienna, Austria); Winfried Mayr (Medical University of Vienna, Austria)

09:45 Monitoring of Knee Joint Mechanics during Electrical Treatment of Denervated Degenerated Muscles

Thordur Helgason (Landspítali - University Hospital, Iceland); Brynjar Vatnsdal (Landspítali University Hospital, Iceland)

10:00 Denervated and degenerated muscle stimulation: advanced image processing techniques and 3-dimensional rendering to monitor muscles restoration

Paolo Gargiulo (University Hospital of Iceland Landspítali, Iceland)

10:15 Analysis of surface electrical stimulation of the human anterior tibialis muscle: A modelling study of a denervated human skeletal muscle

Juliana (Hee-Kyung) Kim (The University of Auckland, New Zealand)

10:30 - 11:00 Coffee Break

S12: Oral Session 12

11:00 - 12:15 Modelling & Control

Session Chairs:

Silvestro Micera (Institute for Biorobotics, Italy)

Thomas Schauer (Technische Universität Berlin, Germany)

11:00

An activation model of motor response and H-reflex under FES

Floor Campfens (University of Twente, The Netherlands); Maria Papaiordanidou (Motor Efficiency and Deficiency Laboratory, University Montpellier 1, France); David Guiraud (INRIA, France); Mitsuhiro Hayashibe (DEMAR team INRIA-LIRMM, France); Alain Varray (Motor Efficiency and Deficiency Laboratory, University Montpellier 1, France)

11:15

Development of a Hill-type model to predict the energetics of sub-tetanic electrical stimulation of muscle. A Pilot Study.

Conor Minogue (Bio-medical Research (BMR) Ltd., Ireland); Louis Crowe (University College Dublin, Ireland); Brian Caulfield (University College Dublin, Ireland); Madeleine Lowery (University College Dublin, Ireland); Richard Reilly (Trinity College Dublin, Ireland)

11:30

Time Delay from Muscle Activation to Torque Generation during Quiet Stance: Implications for Closed-Loop Control via FES

Albert Vette (University of Toronto, Canada); Kei Masani (University of Toronto, Canada); Milos Popovic (University of Toronto, Canada)

11:45

Development of closed loop FES controllers for trunk stabilization in paraplegia

Michele Vanoncini (University of Reading, United Kingdom); William Holderbaum (School of System Engineering, United Kingdom); Brian Andrews (Oxford Brookes University, United Kingdom)

12:00

Neural Oscillator based Control for Wrist Tremor Attenuation via FES

Dingguo Zhang (Lirmm, France); Philippe Poinet (Laboratory LIRMM, UMR CNRS 5506, University of Montpellier II, France); Wei Tech Ang (Nanyang Technological University, Singapore)

12:15 - 12:45 Closing Ceremony

12:45 - 13:30 IFESS General Meeting