

18th IFESS
Annual Conference 2013

Bridging Mind and Body

www.conference2013.ifess.org

5-8 JUNE 2013
Miramar Palace
Donostia-San Sebastián
(Spain)

Edited by
Thierry Keller
Dejan B. Popović



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■ Welcome address



Dr. Thierry Keller, Conference Chair TECNALIA, Health Division

TECNALIA is honoured to host the IFESS2013 Annual Conference that will be held at the Miramar Palace in the centre of the San Sebastian city.

Situated in Spain, San Sebastian is a small city of 183,000 inhabitants, with a remarkably high level of cultural activity for its size. The beauty of its bay, known as the Pearl of the Cantabrian Sea; its situation in a natural amphitheatre facing the sea and protected by mountains; its quality of life, and its famous gastronomy have turned it during the past two centuries into a world-class tourist destination.

The organizers would like to welcome you to the IFESS 2013 Conference. We hope you to enjoy with your colleagues the exciting program of interactive plenary sessions, keynote addresses, an scientific podium and poster sessions, all presented at one of world's most beautiful places for leisure, culture and culinary experience.

'Bridging Mind and Body', our conference theme is a precondition for enabling what is stated in the Greek phrase 'mens sana in corpore sano'. Alike we wish to bring together in the following days all disciplines needed to facilitate control and actuation of the human body being it through electrical means, mechanical means or the combination of it. Therefore, the cultural and impression rich environment of San Sebastian shall be the facilitator for fruitful new ideas, friendships and future collaborations.

I hope that this conference will promote lively exchanges between practitioners and researchers interested in functional electrical stimulation, rehabilitation robotics and motor control. I wish you a great conference and a nice stay in San Sebastian.



■ Preface

Dejan B. Popović, PhD, Dr. Tech, Scientific Chair Faculty of electrical engineering, University of Belgrade

Never in history have there been so many people with sensory-motor disability. In parallel, never has the individual lived as long as they live today. There are many studies showing that activity is beneficial to the overall health of humans with disability, yet the number of practical assistive systems for effective restoration of movement is limited. The IFESS is the society which recognized and nurtures for long time the development of methods, instrumentation and applications aiming to resolve complex problems that potentially would integrate the results from motor control studies and neural engineering to improve the quality of life of humans with special needs.

The sensory and motor systems of a human support the execution of functional motions have three unique features: 1) they are highly redundant; 2) they are organized in a hierarchical structure, yet with many parallel channels; and 3) they are self-organized relying, among other things, on an extremely complex connectionism.

The San Sebastian yearly IFESS 2013 Conference concentrates to some of the above phenomena taking a comprehensive approach; i.e., presents general findings from motor physiology, biomechanics, and automatic control and shows how those can be translated to real life.

Neuroregeneration of the central nervous system is a method that will eventually provide a cure. Although it is still only a perspective, it must be kept in mind as an emerging option; thus, it is very important to preserve as much as possible all resources so that they can be integrated when the time comes.



■ Preface

Some of the aspects discussed relate to the following:

Neurorehabilitation is a method that allows the preserved structures to find their best use if appropriately trained. The intensive, task dependent exercise is showing dramatic effects in humans with special needs.

Neural engineering and rehabilitation robotics are where the ultimate successes at this stage are coming. The development of new devices that interface directly the central and peripheral nervous system allowing wireless communication with the outside world opens new horizons for the better quality of life of many humans.

Assessment methods are instrumental to objectively measure functional impairments and identify the biomechanical and neurophysiological changes caused by the injury or disease. This facilitates essential customization of a rehabilitation neuroprosthesis by providing the following:

- 1) identification of the “minimum muscle set” needed to provide functional movements;
- 2) identification of the output forces required to provide functional movements; and
- 3) assessment if the available muscles can generate the required muscle output.

The belief of the organizers and participants of the IFESS 2013 is that only a comprehensive work that will maximize the usage of the knowledge of motor control and integrate the technology into the natural control systems is likely to be effective.



Organizers



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Supporters



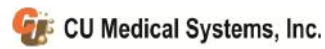
Eusko Jaurlaritza - Gobierno Vasco
www.ejgv.euskadi.net



Cost
www.rehabilitationrobotics.eu



■ Exhibitors



CU Medical Systems, Inc.

130-1, Donghwagongdan-ro, Munmak-eup, Wonju-si,
Gangwon-do 220-801, Korea
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■ Committees

Executive Committee

Thierry Keller PhD (Conference Chair)
Dejan B. Popović PhD (Scientific Chair)

Scientific Committee

Jane Burridge, PhD
Robert Kirsch, PhD
Winfried Mayr, PhD
Philip R. Troyk, PhD

Organizing Committee

Ana Olaizola
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Program Committee

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David Guiraud, PhD
Gon Khang, PhD
Joel Perry, PhD
Milos R. Popovic, PhD
Mirjana Popovic, PhD
Ruediger Rupp, PhD
Michael Russold, PhD
Thomas Schauer, PhD
Thomas Stieglitz, PhD
Paul Taylor, PhD
Jan Veneman, PhD



■ Conference information

Conference Venue

Paseo de Miraconcha, 48
20007 Donostia-San Sebastián, Gipuzkoa
Phone: 943 21 90 22
Fax: 943 21 60 08
palaciomiramar.cverano@ehu.es

Hotel Costa Vasca

Paseo Pio Baroja, 15
20008 Donostia-San Sebastián, Gipuzkoa
Phone: 943 31 79 50
Fax: 943 45 61 01
costavasca.res@barcelo.com

La Perla Restaurant

Paseo de La Concha, s/n. Edificio La Perla
20007 Donostia-San Sebastián, Gipuzkoa
Phone: 943 45 88 56
Fax: 943 46 99 27
info@la-perla.net



■ Conference information

Accreditations

All accreditations will be given at the conference desk reception.
Please, keep them on at all occasions during the conference.

Authors guidelines

The **oral presentations** at IFESS 2013 should be 12 mins in length maximum (unless otherwise indicated in the conference program). There will be a 3 minute discussion and questions/answers period at the end of each presentation.

The presentations should be prepared in PowerPoint and be PC compatible; other file formats, e.g., Mac OS, and other operating systems, may not be supported and their compatibility cannot be guaranteed. There will be time provided prior to your presentation to test your slides on the A/V equipment and computer provided.

It is important to prepare a very short C.V. to provide the chairman an author introduction.

Posters should be in landscape format with the maximum dimensions of width: 841mm and height: 1189mm



■ Conference information

Internet access

During the conference wireless internet connection will be available within all conference rooms. To connect as a wireless network guest user:

1. User your wireless network connection software to connect to: **palacio**
2. The password is: **miramar06**
3. Launch a web browser like Windows Internet Explorer or Mozilla Firefox.



■ Conference information

San Sebastian

Shaped by history, San Sebastian started out as a fishing village; grew as a market town and military fort, with the invasion by Napoleon's troops; and after being almost completely destroyed in 1813 by the garrison's battle against the Anglo-Portuguese, it was chosen by Queen Isabel II as the Royal Family's summer residence and began to flourish as a services city.

It was in the late 19th and early 20th century that San Sebastian emerged as a city of culture, full of amenities and Northern Spain's tourist destination par excellence. Its majestic buildings and their eclectic style, which reflected the contemporary tastes of the Royal Family and bourgeoisie, give it a stately character that has adapted well to changing times.

Cultural activity grew at the same pace as tourist activity, so that today the city boasts a top quality performing arts and cultural programme. The International Film Festival, The 'Jazzaldia' Jazz Festival and Music Fortnight are the highlights of its year-round programme, which also includes themed film festivals such as the 'Surfilm' Surfing Film Festival and the Film and Human Rights Festival, and performing arts events such as the 'dFeria' Theatre Festival.



San Sebastian is world famous as a food tourism destination, since it's collected more Michelin stars per square metre of its territory than anywhere else in the world; and, as the birthplace of the "new Basque cuisine" movement, it's nurtured the renaissance of Basque gastronomy. The quality of its ingredients and its world famous "pintxos" give much pleasure to both local people and visitors all year round.



■ Conference information

Miramar Palace

The Miramar Palace complex is made up of the palace and its park, plus several buildings, gardens and outbuildings.

With a surface area of 34.136 square metres, the complex is a privileged space that offers fabulous views of the bay right where the beaches of La Concha and Ondarreta meet.





■ Conference information

Map of San Sebastian





■ Conference information

Hotels

The organising committee has made arrangements for a block of rooms at several Bil-bao hotels and hostels where rates have been especially negotiated for IDDRG 2011 delegates with respect to standard hotel rates. Hotels have been selected on the basis of category and distance from the conference centre.

We strongly recommend booking your hotel early in order to benefit from these advantageous rates.

Hotel Barceló Costa Vasca****

Maria Cristina *****

Hotel NH Aránzazu ****

Pensión URKIA**

Hotel TrypOrly ****

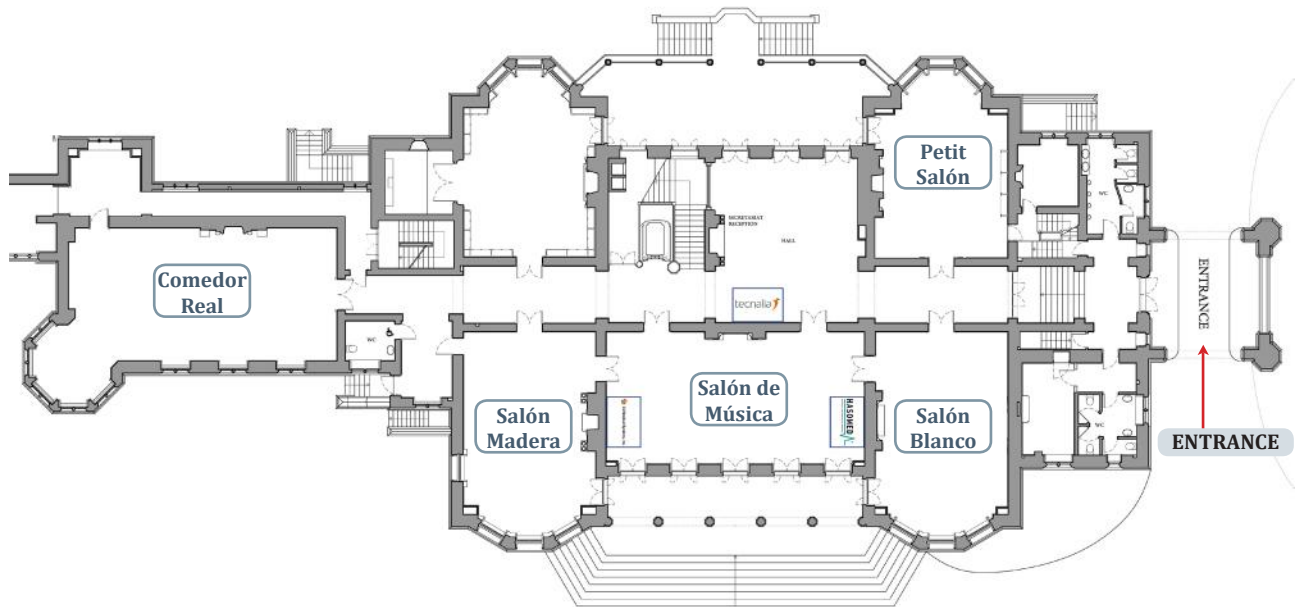
Hotel Astoria 7 ****

Pensión San Ignacio**



■ Conference information

Conference Map





■ Social programme

TECNALIA welcome event

WEDNESDAY, JUNE 05, 2013.

18:30 - 20:30

A welcome reception is organised for all attendees in the Miramar Palace in which a TECNALIA representative will introduce the 2013 edition of IFESS Annual Conference.

Therefore, attendees can get the accreditation and documentation in advance.

Afterwards, all participants are invited to enjoy a drink.

Typical local lunch

THURSDAY, JUNE 06, 2013.

13:30 - 14:45

On the IFESS/COST joint special sessions day, attendees will have the chance to have a typical local lunch at the Costa Vasca Hotel.





■ Social programme

Basque Poster Evening

THURSDAY, JUNE 06, 2013.
18:00 – 22:00

At the end of the IFESS/COST joint special sessions day every attendee will have time to visit the poster exhibition immersed in a basque atmosphere.

Conference dinner and Celebration of Vodvonik Award

FRIDAY, JUNE 07, 2013.
20:00 – 23:00

The IFESS2013 Conference dinner and the celebration of the Vodvonik Award will take place at the La Perla Restaurant, a pleasant gastronomic space, where anyone can enjoy a prestigious cuisine in a fine atmosphere and with a wonderful view on la Concha Bay.





Wednesday | June 05 | 2013 | CONFERENCE PROGRAM

	Comedor Real Room	Salón Madera Room	Salón Blanco Room	Petit Salón Room
09:00 13:00	Wokshop 1: Wearable Functional Electrical Stimulation (FES) and Non-Invasive Electrical Brain Stimulation (ESB): On the Road to Personalized Intervention in Physical Rehabilitation.	Workshop 6: COST WG 1,3 and 4 meeting on New Science-based Robotic Therapies	Workshop 2: FES of Denervated Muscles – A Novel Therapeutic Option after Peripheral Nerve Lesion	Workshop 4: Implantable Neuroprosthesis: From Bench to Bed
13:00 14:30	Lunch Break			
14:30 18:30	Wokshop 1: Wearable Functional Electrical Stimulation (FES) and Non-Invasive Electrical Brain Stimulation (ESB): On the Road to Personalized Intervention in Physical Rehabilitation.	Workshop 6: COST WG 1,3 and 4 meeting on New Science-based Robotic Therapies	Workshop 3: Enhancing Exercise Therapy after Neurological	Workshop 5: COST WG2 meeting on a Standard for Robot-Supported Assessment (STARS)
18:30 20:30	TECNALIA Welcome Event			



Thursday | June 06 | 2013 | COST JOINT SPECIAL SESSION DAY

Comedor Real Room

08:30 | 09:00

Reception

09:00 | 09:15

Conference Opening and Welcome Address – Dr. Ignacio Manzanares (TECNALIA, Health Division Director), Dr. Thierry Keller (Conference chair), Prof. Dejan Popovic (Scientific chair)

09:15 | 10:00

Keynote I – Speaker: Prof. José Carmena, USA: Harnessing Neuroplasticity and Closed-Loop Decoder Adaptation in Brain-Machine Interfaces

10:00 | 11:30

* See the COST Parallel Special Session program in page 26

Parallel Special Session ES1-I: FES control and activation I (Chairs: Thomas Schauer, Kimio Saito)

- 05 → P. M. Pilarski, L. Qi, M. Ferguson-Pell et al.: "Determining the Time until Muscle Fatigue using Temporally Extended Prediction Learning"
- 09 → H. Karimi and A. Erfanian: "Adaptive Terminal Sliding Mode Control of Walker-Supported Standing in Paraplegia"
- 011 → A. Khorasani and A. Erfanian: "Higher-Order Sliding Mode Control of Multi-Joint Movement Using Intramuscular Functional Electrical Stimulation"
- 012 → A. Sarasola Sanz, M. Frigeni, P. Cavallari, et al.: "Design of a Contralaterally Triggered Neuroprosthesis for the Paralyzed Eyelid: Surface EMG Mapping of the Orbicularis Oculi Muscle for Real-time Eye Blink Detection"
- 023 → J. L. Vargas Luna, M. Krenn, J. A. Cortés Ramírez et al.: "Current versus Voltage Control Techniques for Neuromuscular Electrical Stimulation in the Anterior Thigh"
- 027 → M. Same, H. Rouhani, K. Masani et al.: "Closed-loop FES control of ankle plantarflexors and dorsiflexors using an inverted pendulum apparatus"

11:30 | 12:00

Coffee break

12:00 | 13:30

* See the COST Parallel Special Session program in page 26

Parallel Special Session ES1-II: Clinical FES Applications (Chairs: Jane Burridge, Erika Spaich)

- 017 → Y.-H. Lee, S. Y. Yong, S. H. Kim, et al.: "Functional Electrical Stimulation to Ankle Dorsiflexor and Plantarflexor Using Single Foot Switch: The Effect on Knee and Ankle Angle in Patients with Hemiplegia"
- 018 → M. Tenniglo, A. Kottink, L. Schaake, et al.: "Preliminary results of electrical stimulation of the hamstring on stiff-knee gait in chronic stroke patients"
- 019 → M. O'Dell, K. Dunning, P. Kluding, et al.: "The Therapeutic Effect of Functional Electrical Stimulation on Gait Speed in Post-Stroke Drop Foot: Data from the Functional Ambulation: Standard Treatment v. Electrical Stimulation Therapy (FASTEST) Clinical Trial"
- 028 → H. Berends, J. Mastroianni-De Boer, G. Renzenbrink, et al.: "Clinical pilot study into the effect of multi-channel EMG-triggered electrical stimulation on arm function and dexterity after stroke"
- 037 → E. Hallewell, T. Exell, K. Meadmore, et al.: "Goal-orientated Functional Rehabilitation using Electrical Stimulation and Iterative Learning Control for Motor Recovery in the Upper Extremity Post-Stroke"
- 052 → J. Graham and S. Daniel: "Clinical considerations for Foot Drop FES in Incomplete Spinal Cord Injury"



Thursday | June 06 | 2013 | COST JOINT SPECIAL SESSION DAY

Comedor Real Room

13:30 | 14:45

Lunch at the Hotel Costa Vasca Restaurant.

14:45 | 16:15

* See the COST Parallel Special Session program in page 26

Parallel Special Session ES1-III: FES control and activation II (Chairs: Manfred Bijak, Abbas Erfanian)

010 → A. Shabzendedar and A. Erfanian: "Fuzzy Logic Control of Motor Primitives Using Epidural Electrical Stimulation of the Spinal Cord"

058 → A. J. Del-Ama, E. Bravo-Esteban, A. D. Koutsou, et al.: "Customized strategies to manage muscle fatigue in SCI patients during isometric FES-driven muscle contractions"

064 → F. Resquin, F. Brunetti and José L. Pons: "A system for spasm detection during robotic therapies: preliminary results"

030 → A. Cologni, Th. Seel, M. Madaschi, et al.: "Automatic Adjustment of Electromyography-Based FES Control"

031 → J. Szecsi and B. Kreuzpointner: "Muscle stimulation sequences for different forms of mechanically constrained locomotion"

059 → K. Saito, T. Matsunaga, T. Iwami et al.: "Evaluation of trunk stability in sitting position using a new device"

16:15 | 16:45

Coffee break

16:45 | 17:45

Keynote II – Speaker: Prof. Marco Molinari, Italy: Advanced Technology and Neurorehabilitation. What Patients and Clinicians Want Versus What Neuroengineering Research Provides

18:00 | 22:00

Basque Poster Evening



Friday | June 07 | 2013 | CONFERENCE DAY

Comedor Real Room	
09:00 09:45	Keynote III – Speaker: Prof. Robert F. Kirsch, USA: Reanimating the Limbs: FES Research in Cleveland - Accomplishments and Plans
09:45 11:15	Session ES2-I: Upper Extremity FES (Chairs: Dejan B. Popovic, Robert F. Kirsch) 066 → A. Westerveld, A. Kuck, A. Schouten, et al.: “Passive Reach and Grasp with Functional Electrical Stimulation and Robotic Arm Support” 025 → E. Imatz, U. Hoffmann, J. Veneman, et al.: “Stimulation Discomfort Comparison of Asynchronous and Synchronous Methods with Multi-Field Surface Electrodes” 029 → T. Exell, Ch. Freeman, K. Meadmore, et al.: “Stimulation of Hand Postures Using an Electrode Array and Iterative Learning Control” 040 → A. D. Koutsou, E. Rocón De Lima, F. Brunetti, et al.: “A novel method for the analysis of forearm muscle activation by selective Sfes” 044 → M. Štrbac, N. Malešević, R. Čobeljić et al.: “Feedback control of the forearm movement of tetraplegic patient based on Microsoft Kinect and multi-pad electrodes” 046 → L. Popović Maneski, M. Janković, T. Jevtić, et al.: “Functional electrical stimulation (FES) for augmenting of the reaching and grasping”
11:15 11:45	Coffee break
11:45 13:15	Session ES2-II: Vodovnik Award Short Presentations
13:15 14:30	Lunch at the Miramar Palace
14:30 16:00	Session ES2-III: Physical training, cycling, rowing, fitness (Chairs: Milos R. Popovic, Simona Ferrante) 02 → B. Goodarzi and M.C. Kumar: “Effect of Electro Muscle Stimulation and Resistance Training on Body Weight and WHR in Over Weight People” 04 → O. Giggins, H. Butler, L. Crowe et al.: “An Investigation into the Acute Effects of Neuromuscular Electrical Stimulation Exercise on Oxygen Consumption in Type 2 Diabetes.” 036 → M. Popovic, D. Sayenko, T. Yoshida, et al.: “Post Spinal Cord Injury Cardiovascular Response to Dynamic Functional Electrical Stimulation during 70° Head-up Tilt” 039 → E. Peri, E. Ambrosini, A. Pedrocchi, et al.: “Cycling Induced by Functional Electrical Stimulation in Hemiparetic Adolescent: A Case Series Studies” 055 → T. Watanabe, T. Murakami and Y. Handa: “A Feasibility Study of FES Cycling with Cycling Wheelchair “Profhand” 056 → Y.-H. Lee, J. M. Shinn, S. Y. Yong, et al.: “Effect of S1 Dermatome Electrical Stimulation during Stance Phase in addition to Ankle Dorsiflexor Stimulation during Swing Phase on Hemiplegic Gait – A Case Report”
16:00 19:30	Free activity in San Sebastian and surroundings
20:00 23:00	Conference Dinner and Celebration of Vodovnik Award at La Perla Restaurant



Saturday | June 08 | 2013 | CONFERENCE DAY

Comedor Real Room	
09:00 09:45	Keynote IV – Speaker: Prof. Herman van der Kooij, The Netherlands: Reanimating the Limbs: Rehabilitation Robotics and Novel Assessment Methods for the Lower Extremities
09:45 11:15	Session ES3-I: Lower Extremities (Chairs: Jaques Bobet, Strahinja Došen) <i>06</i> → J. Bobet, S. Chong, R. Rolf et al.: “Walking with Functional Electrical Stimulation and Unlocking Braces in Thoracic-level Paraplegia” <i>016</i> → A. Roshani and A. Erfanian: “A Fuzzy Logic Controller with Rule-Based Co-Activation Supervisor for Control of Ankle Movement Using Multielectrode Intraspinal Microstimulation” <i>050</i> → Th. Seel, S. Schäperkötter, M. Valtin, et al.: “Design and Control of an Adaptive Peroneal Stimulator with Inertial Sensor-based Gait Phase Detection” <i>060</i> → T. Matsunaga, D. Kudo, K. Saito, et al.: “Functional Electrical Stimulation (FES) for the correction of hemiplegic drop foot”
11:15 11:45	Coffee Break
11:45 13:15	Session ES3-II: Neuromodulation, sensory stimulation, afferent feedback (Chairs: Winfried Mayr, Ina Tarkka) <i>020</i> → M. A. Richard, O. Bello, E. G. Spaich et al.: “Modulation of the nociceptive withdrawal reflex elicited after an auditory cue during the gait initiation process” <i>038</i> → S. Dosen, G. Krajoski, D. Džojić, et al.: “Closed Loop Control of Dynamic Systems using Electrotactile Feedback” <i>041</i> → P. Aqueveque, R. Lopez and E. Pino: “Electrical Stimulation Device to Produce Inhibitory Action in Subjects with Nocturnal Bruxism: Preliminary Results” <i>045</i> → M. Stevanovic, M. Perovic, T. Jevtić, et al.: “Electrical stimulation of skin afferents: a method for transmitting touch from the artificial hand to the brain” <i>048</i> → N. Miljkovic, O. Đorđević, G. Bijelić, et al.: “EMG and ultrasound imaging measurements of low back muscles” <i>062</i> → L. Popa and P. Taylor: “An investigation into the effect of FES on bradykinesia in Parkinson’s Disease”
13:15 14:30	Lunch at the Miramar Palace
14:30 15:15	IFESS General Assembly
15:15 16:00	Keynote V - Speaker: Prof. Philip Troyk, USA, Engineering Neural Prostheses: Meeting the Challenges of FES
16:00 16:30	Coffee Break



Saturday | June 08 | 2013 | CONFERENCE DAY

Comedor Real Room

16:30 | 18:00

Session ES3-III: Neural Interfaces, Sensors, Implantable FES Technology (Chairs: Philip Troyk, Thomas Stieglitz)

03 → M. Rohm, R. Rupp, M. Schneiders, et al.: "Hybrid Brain-Computer Interfaces for control of neuroprosthetic systems for restoration of upper limb functions in high spinal cord injured individuals"

022 → A. Ivorra and L. Becerra-Fajardo: "Wireless Microstimulators Based on Electronic Rectification of Epidermally Applied Currents: Safety and Portability Analysis"

032 → M. Abdallah, F. Soulier, S. Bernard et al.: "Low-noise and Low-power Front-end for True-tripolar ENG Amplifier"

034 → L. Lonys, A. Vanhoestenbergh, V. Huberty, et al.: "A first prototype of an endoscopically implantable gastrostimulator"

043 → M. Han, D. McCreery and Y. Smirnova: "In-Vivo Charge Injection Capacity of Implanted Microelectrodes In a Hybrid Array"

061 → J. Ernst, M. Hewitt, F. von Lewinski, et al.: "Towards physiological ankle movements with the ActiGait implantable drop foot stimulator in chronic stroke"

18:15

End of the conference



POSTER PRESENTATIONS

Thursday | June 06 | 2013 | 18:00 - 22:00

P7	I. Tarkka	nTMS equivalence with Upper Limb Functional Tests in Stroke Patients
P8	M. Ibitoye, N. A. Hamzaid	Myoelectric Signal and FES-evoked Muscle Contraction: Muscle Force and Fatigue Assessments.
P13	D. Zhang	Exploring the Mechanism of Tremor based on Experiments on Real Subjects using FES
P14	E. Krueger, E. M. Scheeren, G. N. Nogueira-Neto et al.	Time-Frequency Muscle Responses Elicited by Different FES Modulating Frequencies in Paraplegics
P15	S. Qiu, T. Zhai, R. Xu et al.	Intelligent Algorithm Tuning PID Method of Function Electrical Stimulation Using Knee Joint Angle
P21	O. Bello, M. A. Richard, E. G. Spaich et al.	Effects of painful stimulation on spatiotemporal characteristics of gait initiation
P24	L. Tedesco Triccas, M. Donovan-Hall, J. Burrridge et al.	A Questionnaire Developmental Study exploring the views about the use of Functional Electrical Stimulation in Spinal Cord Injury. Is cognitive interviewing worth it?
P26	I.D. Constantin, M. Poboroniuc, O. Rupert	New Method and Perspectives in FES&BCI Based Rehabilitation
P33	E. Menzies, C. Minogue, M. Lowery	Transcutaneous Functional Electrical Stimulation of the Pelvic Floor Muscles: a Simulation Study
P35	M. Kostić, M. Popović	The Modified Drawing Test
P42	J. Judy and T. Wheeler	Reliable Neural Interfaces for Life-Long Intuitive Control of Prosthetic Devices
P51	Y. Okudera, T. Matsunaga, Y. Watanabe et al.	Effects of high frequency magnetic stimulation for the peripheral nerve in person with cervical myelopathy: a case report
P53	M. Watanabe, T. Matsunaga, Y. Okudera et al.	Comparison of the Effects of Two Different High frequency Repetitive Transcranial Magnetic Stimulation on the upper limb function in Healthy subjects
P54	N. Shibata, T. Matsunaga, Y. Shimada et al.	Improved Function of the upper extremity in Persons with Cervical Spine Disorders by Therapeutic Electrical Stimulation
P57	E. Hortal, A. Úbeda, E. Iáñez et al.	Selection of the best classifier for differentiating mental tasks in a brain-machine interface
P63	P. Aqueveque, E. Pino and C. Wandersleben	A Low Cost FES Cycling System Using Fuzzy Logic Control



Thursday | June 06 | 2013 | CONFERENCE PROGRAM

	Salón Madera Room		Salón Blanco Room
10:00 12:00	<i>Special Session CT1-I: Combined Robotic/ES Technologies I (Chair: Jane Burridge)</i>	10:00 11:30	<i>Special Session RR1-I: Rehabilitation Robotics: EU Projects (Chair: Jan Veneman)</i>
10:00 10:10	C1 - Jane Burridge <i>Introduction and background to ES and Robotics for stroke rehabilitation</i>	10:00 10:30	C8 - Juan C. Moreno and José L. Pons <i>BETTER: Improving robotic gait training in stroke with a top-down approach</i>
10:10 10:40	C2 - Chris Freeman <i>Use of advanced modelling and control strategies to increase the effectiveness and scope of stroke rehabilitation</i>	10:30 11:00	C9 - Jan Veneman <i>BALANCE: FP7-ICT project overview</i>
10:40 11:10	C3 - Ann-Marie Hughes <i>Clinical trials</i>	11:00 11:30	
11:10 11:40	C4 - Thierry Keller <i>Electrode arrays / Translational aspects of technologies</i>		
11:40 11:50	All <i>General discussion round</i>		
		12:00 13:30	<i>Special Session RR1-II: Advanced Rehabilitation Technologies and BCI (Chair: Ander Ramos)</i>
		12:00 12:30	C10 - Enrique Hortal Quesada, Andrés Úbeda, Eduardo Iáñez, Daniel Planelles and José María Azorín <i>Selection of the best classifier for differentiating mental tasks in a brain-machine interface</i>
		12:30 13:00	C11 - Anastasios Bezerianos, Ignacio Delgado and Nitish Thakor <i>System and methods to stimulate and monitor the brain state enhancement</i>
		13:00 13:30	C12 - Ander Ramos-Murguialday <i>Neurophysiological correlates of motor recovery in chronic stroke: a pilot study</i>



Thursday | June 06 | 2013 | CONFERENCE PROGRAM

Salón Blanco Room	
14:45 16:15	<i>Special Session RR1-III: Rehabilitation Robotics: Affordable technologies and assessment methods (Chair: Zlatko Matjacic)</i>
14:45 15:15	C13 - Zlatko Matjacic <i>Toward affordable and clinically wide-spread rehabilitation robotics</i>
15:15 15:45	C14 - Joel C. Perry, Cristina Rodriguez-De-Pablo, Sivakumar Balasubramanian, Francesca Irene Cavallaro and Thierry Keller <i>ArmAssist Telerehabilitation: assessment and training at home</i>
15:45 16:15	C15 - Milos Kostic and Maša Popović <i>The modified drawing test: A tool for low cost assesemnt</i>

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