

Tuesday 16 Oct

8:30 - 9:40

ICNR and WeRob registrations

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|--------------|--|---|---|-------------------------------|---|
| | ICNR Session | | | WeRob Session | INBOTS Sessions |
| 9:40 - 11:10 | WS1. BCIs for stroke rehabilitation and for assessment in disorders of consciousness | WS5. Artificial Supernumerary Limbs for Clinical Neuroscience | WS6. The RONDA project: a robotic gym for stroke rehabilitation | WeR2 - Soft Wearable Robotics | INBOTS1 Promote entrepreneurship and non-technical support to SMEs: success stories and new opportunities |

11:10-11:30

Coffee break

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|-------------|--|---|---|---|
| 11:30-12:20 | WS1. BCIs for stroke rehabilitation and for assessment in disorders of consciousness | WS5. Artificial Supernumerary Limbs for Clinical Neuroscience | WS6. The RONDA project: a robotic gym for stroke rehabilitation | INBOTS1 Promote entrepreneurship and non-technical support to SMEs: success stories and new opportunities |
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12:20-13:00

Poster Session

13:00-14:10

Lunch

14:10-15:00 ICNR- WeRob Plenary #1 - Marco Santello: Sensorimotor hand function: Bridging the gap between control mechanisms and clinical translation

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| 15:00-16:30 | WS2. Worldwide consensus of NeuroRehabilitation | WS3. State of the art and recent advances in HD-sEMG: prospects in neurorehabilitation | WS4. Advances and Challenges on the Development, Testing and Assessment of Myo-Control for Prostheses and Assistive/Rehabilitation Robots | WeR3. Subject-centered based approaches for controlling Wearable Robots | INBOTS2 Debate on legal, ethics & socio-economic aspects |
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16.30-17:00

Coffee break

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| 17:00-18:30 | WS2. Worldwide consensus of NeuroRehabilitation | WS3. State of the art and recent advances in HD-sEMG: prospects in neurorehabilitation | WS4. Advances and Challenges on the Development, Testing and Assessment of Myo-Control for Prostheses and Assistive/Rehabilitation Robots | WeR4. Robotic and neuroprosthetic balance management approaches for walking assistance | INBOTS2 Debate on legal, ethics & socio-economic aspects |
| 18:30-20:00 | Welcome party and official opening | | | | |

ICNR- WS1. BCIs for stroke rehabilitation and for assessment in disorders of consciousness

| Authors | Title |
|---------------------|---|
| Alexander Heilinger | Introduction to major methodological approaches of BCI for stroke rehabilitation, coma assessment and communication – 20 minutes |
| | Strategies to run motor recovery training with BCI systems – 20 minutes |
| | Cognitive assessment with BCI technology of DOC and locked-in patients – 20 minutes |
| | Practical session with a live demonstration of stroke rehabilitation system using BCI technology – recoveriX – 45 minutes |
| | Practical session with a live demonstration of an assessment system for DOC patients using BCI technology – mindBEAGLE – 45 minutes |

ICNR- WS2 - Worldwide consensus of NeuroRehabilitation

| Authors | Title |
|------------------|--|
| Hitoshi Hirata | Opening Remarks |
| Marco Molinari | EU attitude of Neurorehabilitation from Medical viewpoint |
| Juan Moreno | EU attitude of Neurorehabilitation from Engineering viewpoint |
| William Z Rymer | US Clinical Experience with Wearable Exoskeletons as Therapeutic Rehabilitation Devices Following Injury to the CNS: An Evolving Story |
| TBD | US attitude of Neurorehabilitation from Engineering viewpoint |
| Ichiro Miyai | Asian attitude of Neurorehabilitation from Medical viewpoint |
| Shingo Shimoda | Role of engineering technique for neurorehabilitation |
| Fady Alnajjar | Middle East attitude of Neurorehabilitation from Engineering viewpoint |
| Panel discussion | Chair: Prof. Hitoshi Hirata NeuroRehabilitation Consensus for worldwide collaboration |

ICNR- WS3. State of the art and recent advances in HD-sEMG: prospects in neurorehabilitation

Authors

Title

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| Taian Vieira | Interpretation of Surface Electromyograms: The Spatial Localisation of Muscle Activity |
| Alberto Botter | Integration of HD-sEMG and ultrasounds for the assessment of muscle function |
| Giacinto Luigi Cerone | Wearable and Wireless HD-sEMG Acquisition Systems: Recent advances |
| Ales Holobar | Cumulative spike train outperforms the root-mean-square metric in muscle excitation estimation from dynamic high-density EMG |
| Dario Farina | High-Density EMG: Neurophysiology meets Biomechanics |

ICNR- WS4. Advances and Challenges on the Development, Testing and Assessment of Myo-Control for Prostheses and Assistive/Rehabilitation Robots

| Authors | Title |
|--|--|
| Domenico Buongiorno, Michele Barsotti, | Introduction: Advances and challenges on MyoControl systems |
| Ivan Vujaklija | Translating Advanced Myocontrol from the Laboratory to Clinics |
| Andrea Turolla | Referral-to-therapy and treatment of upper limb using closed-loop Myo-Control, in neurological disorders |
| Vittorio Sanguineti, Nicola Lotti | EMG-driven force fields: toward a myoprocessor for 'virtual biomechanics |
| Strahinja Dosen | Closed-loop myoelectric interfacing in assistive robotics |
| Christian Cipriani | Classification of Transient Myoelectric Signals for the Control of Multi-Grasp Hand |

Claudio Castellini

Interactive (machine) learning, a key component of the HRI of the future

ICNR- WS5. Artificial Supernumerary Limbs for Clinical Neuroscience

Authors

Title

Etienne Burdet

Motor control of 6-fingered hand

Domenico Prattichizzo and Simone Rossi
(tandem talk)

The Robotic Sixth Finger: A wearable device for grasp compensation and augmentation

Tamar Makin

Neural correlated of hand augmentation

Antonio Bicchi

An Active Supernumerary Hand for Grasping Assistance: the SoftHand X.

ICNR- WS6. The RONDA project: a robotic gym for stroke rehabilitation

Authors

Title

Silvestro Micera

Introduction to the RONDA project

Cristina Spalletti

Robotic Rehabilitation and Neuromodulation after stroke: novel approaches in a mouse model

Emilio Trigili

Design and control of upper-limb exoskeletons for rehabilitation and assistance in daily-life activities

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| Antonio Frisoli - Michele Barsotti- Fabio Stroppa | Improved exoskeleton robotic training in post-stroke upper limb rehabilitation: toward a motor learning paradigm |
| Federico Posteraro | RONDA: a classification of upper limb robotic device to be used in clinical practice |
| Carmelo Chisari - Giuseppe Lamola | RONDA: Neurophysiological correlates of motor learning using upper limb robotic devices in stroke patients |

WeR2. Soft Wearable Robots

Organizers **Conor J. Walsh, SEAS Harvard; Jesús Ortiz, IIT-ADVR; Eduardo Rocon, CSIC; Lucia Beccai, IIT-CMBR; Chris Baten, RRD; Freygardur Thorsteinsson, Össur; Julia Götz, Accelopment.**

| Authors | Title |
|--|--|
| Michele Xiloyannis, Domenico Chiaradia, Antonio Frisoli and Lorenzo Masia | Characterisation of pressure distribution at the interface of a soft exosuit: towards a more comfortable wear |
| Allan J Veale, Kyrian Staman and Herman van der Kooij | Realizing Soft High Torque Actuators for Complete Assistance Wearable Robots |
| Valerie Power, Adam de Eyto, Bernard Hartigan, Jesús Ortiz and Leonard O'Sullivan | Application of a User-Centered Design Approach to the Development of XoSoft – a Lower Body Soft Exoskeleton |
| Ali Sadeghi, Alessio Mondini and Barbara Mazzolai | A Preliminary Experimental Study on Variable Stiffness Structures Based on Textile Jamming for Wearable Robotics |
| Massimo Totaro, Eliza Bottenberg, Richard Groeneveld, Laura Erkens, Alessio Mondini, Ger Brinks and Lucia Beccai | Towards embroidered sensing technologies for a lower limb soft exoskeleton |
| Conor Walsh | Recent Results from Evaluation of Soft Wearable Robots in Clinical Populations |

WeR3. Subject-centered based approaches for controlling Wearable Robots

Organizers Samer Mohammed, Université Paris-Est Créteil (UPEC), France; Mohamed Bouri, EPFL, Lausanne, Switzerland.

Authors

Title

Randa Kaddaj Mallat, Vincent Bonnet, Mohamad Khalil and Samer Mohammed

Toward an Affordable Multi-Modal Motion Capture System Framework for Human Kinematics and Kinetics Assessment

Mehmet C. Yildirim, Ahmet Talha Kansizoglu, Polat Sendur and Barkan Ugurlu

High Power Series Elastic Actuator Development for Torque-Controlled Exoskeletons

Amalric Ortlieb, Peter Lichard, Florin Dzeladini, Romain Baud, Auke Ijspeert, Hannes Bleuler and Mohamed Bouri

Investigation on Variable Impedance Control for Modulating Assistance in Walking Strategies with the AUTONOMYO exoskeleton

Fabian Just, Daniel Gunz, Jaime Duarte, Davide Simonetti, Robert Riener and Georg Rauter

Improving Usability of Rehabilitation Robots: Hand Module Evaluation of the ARMin Exoskeleton

Simon Gallo

Wearable and multimodal haptic feedback for restoring human body perception

Mohamed Bouri

Lower Limb Exoskeletons, From Specifications to Design

WeR4. Robotic and neuroprosthetic balance management approaches for walking assistance

Organizers Antonio del Ama, National Spinal Cord Injury Hospital, Spain; Juan Moreno, Cajal Institute, Spain; and Jan Veneman, Hocoma AG.

Authors**Title**

Zlatko Matjacic, Matjaž Zadavec, Nataša Bizovičar, Nika Goljar and Andrej Olenšek

Novel perturbation-based approaches using pelvis exoskeleton robot in gait and balance training after stroke

Eva Swinnen, Jean-Pierre Baeyens, Nina Lefebber, Emma De Keersmaecker, Stieven Henderix, Marc Michielsen and Eric Kerckhofs

Balance during bodyweight supported and robot-assisted walking

Eleonora Croci, Roger Gassert and Camila Shirota

Maintaining gait balance after perturbations to the leg: kinematic and electromyographic patterns

Mariangela Filosa, Ilaria Cesini, Elena Martini, Giacomo Spigler, Nicola Vitiello, Calogero Maria Oddo and Simona Crea

A vibrotactile sensory feedback system for lower-limb amputees

Federica Barberi, Federica Aprigliano, Emanuele Gruppioni, Angelo Davalli, Rinaldo Sacchetti, Alberto Mazzoni and Silvestro Micera

Fast online decoding of motor tasks with single sEMG electrode in lower limb amputees

Ilaria Cesini, Giacomo Spigler, Sahana Prasanna, Domitilla Taxis, Filippo Dell'agnello, Elena Martini, Simona Crea, Nicola Vitiello, Alberto Mazzoni and Calogero Maria Oddo

A wearable haptic feedback system for assisting lower-limb amputees in multiple locomotion tasks

INBOTS1. The RONDA project: a robotic gym for stroke rehabilitation**Authors****Title**

Roberto Conti, Sarah Terreri

Brief introduction of the workshop objectives

Nicola Vitiello, IUVO

IUVO: a successful spin-off company on wearable robotics technologies

Francesco Ferro, PAL Robotics

PAL robotics: Humanoid robotics vision

Jody Saglia, Movendo

Movendo: an IIT spin-off company

Andrea Bisson, Comau

Comau Robotics: interactive robotics in the industrial field

Andrea Bisson, Comau

Key Intellectual Property Aspects of Robotics

Sebastian Weide, VDI/VDE

Database tools for analysing the market

Roberto Conti, Sarah Terreri

Final discussion about the two sessions

INBOTS2. Debate on legal, ethics & socio-economic aspects :TBD

Tuesday 16 Oct - Poster session

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| Daniele Borzelli | Consistency of myoelectric control across multiple sessions | ICNR- WS4. Advances and Challenges on the De Testing and Assessment of Myo-Control for Pros Assistive/Rehabilitation Robots |
| Masashi Sekine, Kazuya Kawamura and Wenwei Yu | Optimizing body thickness of watchband-type soft pneumatic actuator for feedback of prosthesis grasping force | WeR2. Soft Wearable Robots |
| John Nassour, Sidhdharthkumar Vaghani and Fred Hamker | Design of Soft Exosuit for Elbow Assistance Using Butyl Tubes Rubber and Textile | WeR2. Soft Wearable Robots |
| Domenico Chiaradia, Michele Xiloyannis, Massimiliano Solazzi, Lorenzo Masia and Antonio Frisoli | Comparison of a Soft Exosuit and a Rigid Exoskeleton in an Assistive Task | WeR2. Soft Wearable Robots |
| Ivanka Veneva, Dimitar Chakarov, Michail Tsveov and Pavel Venev | Exoskeleton with Soft Actuation and Haptic Interface | WeR2. Soft Wearable Robots |
| Yi Sun, Aaron Jing Yuan Goh, Miao Li, Hui Feng, Jin Huat Low, Marcelo H. Ang. Jr and Raye Chen Hua Yeow | Improved Fabrication of Soft Robotic Pad for Wearable Assistive Devices | WeR2. Soft Wearable Robots |
| Rainier Natividad, Tiana Miller-Jackson, Wai Hong Sin and Chen-Hua Yeow | The Exosleeve: A Soft Robotic Exoskeleton for Assisting in Activities of Daily Living | WeR2. Soft Wearable Robots |
| Jong-Won Lee, Juwhan Bae, Chilyong Kwon and Gyoosuk Kim | The Effect of Negative Damping at the Hip Joint during Level Walking: A Preliminary Testing | WeR3. Subject-centered based approaches for controlling Wearable Robots |
| Maria Lazzaroni, Stefano Toxiri, Darwin Caldwell, Elena De Momi and Jesús Ortiz | Overview and challenges for controlling back-support exoskeletons | WeR3. Subject-centered based approaches for controlling Wearable Robots |
| Nicola Secciani, Matteo Bianchi, Alessandro Ridolfi, Federica Vannetti and Benedetto Allotta | Assessment of a hand exoskeleton control strategy based on user's intentions classification starting from surface EMG signals | WeR3. Subject-centered based approaches for controlling Wearable Robots |
| Olivier Bordron, Clément Huneau, Eric Le Carpentier and Yannick Aoustin | Contribution of a Knee Orthosis over Walking | WeR3. Subject-centered based approaches for controlling Wearable Robots |
| Titus Hanson, Chris Bitikofer, Bahram Sobbi and Joel Perry | Design of Mobile Digit Assistive System (MIDAS): A Passive Hand Extension Exoskeleton for Post Stroke Rehabilitation | WeR3. Subject-centered based approaches for controlling Wearable Robots |
| Marko Jamšek and Jan Babič | Human trunk stabilization with hip exoskeleton for enhanced postural control | WeR4. Robotic and neuroprosthetic balance management approaches for walking assistance |

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| Amre Eizad, Muhammad Raheel Afzal, Hosu Lee, Sung-Ki Lyu and Jungwon Yoon | Development of a Wearable Haptic Feedback System for Limb Movement Symmetry Training | WeR4. Robotic and neuroprosthetic balance management approaches for walking assistance |
| Arantxa Rentería | Medical robotics and the daunting certification process | INBOTS |
| Aníbal Monasterio, Daniel López, Manuel Aparicio, Ricardo Morte, Txetxu Ausín y Mario Toboso | Conceptual Analysis: technology, machine and robot | INBOTS |
| Mario Toboso, Ricardo Morte, Aníbal Monasterio, Txetxu Ausín, Manuel Aparicio y Daniel López | Robotics as an instrument for social mediation | INBOTS |
| Giuseppe Cotugno, Dario Turchi, Duncan Russell and Graham Deacon | Second Hands: A collaborative maintenance robot for automated warehouses. Implications for the industry and the workforce | INBOTS |
| Eduard Fosch Villaronga and Christopher Millard | Loud and Cloud: Human Responsibility for Cloud Robotics Ecosystems | INBOTS |