XXIV CONGRESSO NAZIONALE

SIAMOC 2024

Società Italiana di Analisi del Movimento in Clinica

2-5 Ottobre

Presidente **Stresa (VB)**
Marco Godi

PATROCINI

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VERBANO CUSIO OSSOLA

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TECNOLOGIE DIGITALI
N/S | A.I.FI.

fisioterapia neurologica &
neuroscienze

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Marco Godi – *ICS Maugeri IRCCS, Veruno (NO)*
Marica Giardini – *ICS Maugeri IRCCS, Veruno (NO)*
Ilaria Arcolin – *ICS Maugeri IRCCS, Veruno (NO)*
Stefano Corna – *ICS Maugeri IRCCS, Veruno (NO)*

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Valeria Belluscio – *Università Foro Italico, Roma*
Stefano Filippo Castiglia – *Sapienza Università di Roma*
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Fabiola Spolaor – *Università di Padova*
Rita Stagni – *Alma Mater Studiorum Università di Bologna*

SIAMOC 2024

È con entusiasmo che la "perla del lago Maggiore", Stresa, si prepara ad accogliere il congresso annuale della Società Italiana di Analisi del Movimento in Clinica (SIAMOC), giunto alla sua ventiquattresima edizione. Il congresso, itinerante, vanta l'avere avuto sede nelle principali città italiane, tra cui lo scorso anno nella Capitale.

È l'occasione di ritrovo dei membri della società SIAMOC, il cui intento è quello di progredire nella ricerca scientifica del movimento umano, con un'interazione tra il mondo clinico e quello universitario, nella sinergia delle diverse figure professionali. In ogni edizione i ricercatori hanno la possibilità di condividere il loro recente lavoro e di formarsi nella conoscenza di quello altrui, anche grazie agli ospiti che tengono le lezioni magistrali. Infatti, professori internazionalmente selezionati, sono invitati ad intervenire con i loro contributi di altissimo livello.

A questo quadro di valore scientifico, sarà quindi Stresa e il suo territorio circostante a fare da cornice. Piccola, poco conosciuta rispetto alle città capoluogo, ma così caratteristica e suggestiva, Stresa può essere davvero scoperta come la perla che è, racchiusa dalle montagne e affacciata sul lago e sulle sue isole.

"Più grande è il paesaggio, più piccolo è l'uomo"

scriveva Dumas padre, dopo essere rimasto incantato dal paesaggio di Stresa e del suo Lago Maggiore.
Con l'augurio di potersi sentire piccoli e salire così insieme sulle spalle dei giganti, vi aspettiamo a Stresa per il Congresso SIAMOC 2024!

Il Presidente
Marco Godi

ANALISI BIOMECCANICA NEL RUNNING PER IL TRATTAMENTO DEGLI INFORTUNI

WORKSHOP
MERCOLEDI' 2/10

Silvia Fantozzi
Davide Vallesio

10.00   Registrazione Incontri pre-congressuali

11.00   **Presentazione e introduzione del workshop**

11.10   **Biomeccanica in laboratorio: l'uso di pedane di forza e stereofotogrammetria per l'analisi della corsa**
Silvia Fantozzi

11.40   **Ground Reaction Forces: come possiamo modularle e quali implicazioni hanno su performance e prevenzione infortuni? Il ruolo della forza e del ROM**
Davide Vallesio

12.00   **Tecnologie indossabili per l'analisi della corsa sul campo: sensori inerziali e di pressione**
Silvia Fantozzi

12.35   **Su quali parametri cinematici o cinetici è possibile agire per migliorare l'efficienza della corsa?**
Davide Vallesio

13.00   Pausa

14.00   **Le scarpe da running: come il progresso tecnologico modifica la biomeccanica della corsa?**
Silvia Fantozzi, Davide Vallesio

14.45   **Attività pratica: valutazione biomeccanica di due runner su treadmill**
Silvia Fantozzi, Davide Vallesio

16.00   Conclusione del workshop

INTELLIGENZA ARTIFICIALE NELL'ANALISI CLINICA DEL MOVIMENTO: QUANDO PUÒ ESSERE UTILE?

corso
MERCOLEDI' 2/10

**Valentina Agostini
Marco Ghislieri
Francesco Marenco**

10.00	Registrazione Incontri pre-congressuali
11.00	**Presentazione e introduzione del corso**
11.10	**Intelligenza artificiale, machine learning, deep learning** Valentina Agostini
11.30	**"Big data" nell'analisi del movimento: il necessario input dell'IA** Valentina Agostini
11.50	**Applicazioni cliniche e prospettive di ricerca: quando l'IA può essere utile?** Valentina Agostini
12.10	**Dibattito: explainability, integrazione della pratica clinica, questioni etiche** Valentina Agostini, Francesco Marenco
13.00	Pausa
14.00	**Pipeline per la costruzione e validazione di un modello IA per l'analisi clinica del movimento** Marco Ghislieri
14.30	**Attività pratica. Dall'acquisizione dei segnali alla valutazione del modello** Valentina Agostini, Marco Ghislieri, Francesco Marenco
16.00	Conclusione del corso

16.00   Registrazione Congresso

17.00   **Cerimonia di apertura**

17.30   **LEZIONE MAGISTRALE 1**
         Chairman: Ugo Della Croce

         How humans evolved to first walk and then run, and why it matters

         Prof. Daniel E. Lieberman
         Edwin M. Lerner II Professor of Biological Sciences; Chair of the Department of Human Evolutionary Biology at Harvard University

         Discussione

18.45   Cocktail di benvenuto

20.00   Conclusione della giornata

08.00   Registrazione Congresso

08.45   **Saluti e apertura del Presidente del Congresso**

09.00   **PRESENTAZIONI ORALI 1**
Sport Science: Integrating Technology and Human Performance
Chairs: Valeria Belluscio, Marco Caruso

Fatigue-induced neuromuscular alterations in single-leg hop for distance jumps suggest an increased risk of anterior cruciate ligament injury
M. Nardon[a], M. Zanoni[b], M. Bartesaghi[a], A. Zaza[c], C. Perin[d], C. Alessandro[a]
[a]School of Medicine and Surgery / Sport and Exercise Medicine, University of Milano-Bicocca, Monza, Italy; [b]Department of Life Sciences / Division of Sport, Health and Exercise Sciences, Brunel University London, Uxbridge, United Kingdom; [c]Department of Biotechnology and Biosciences / Sport and Exercise Medicine, University of Milano-Bicocca, Milan, Italy; [d]School of Medicine and Surgery / Physical and Rehabilitative Medicine, University of Milano-Bicocca, Monza, Italy

An inertial-based method to characterize response to footwear features
R. Rossanigo[a,b], C. Agresta[c], S. Bertuletti[d], B. Utzeri[d], J. Zendler[e], V. Camomilla[f], A. Cereatti[d]
[a]University of Sassari, Sassari, Italy; [b]NeuroRehab Research Center, Lausanne University Hospital (CHUV), Lausanne, Switzerland; [c]University of Washington, Seattle, Washington, USA; [d]Politecnico di Torino, Turin, Italy; [e]Rimkus Consulting Group, Houston, Texas, USA; [f]University of Rome Foro Italico, Rome, Italy

The impact of sports training on the Spinal Cord Injury individual's balance: the PITS project
C. Chieffo[a], G. Chini[a], T. Varrecchia[a], I. Gennarelli[b], A. Silvetti[a], V. Molinaro[a], I. Poni[c], A. Mariotti[c], S. Tiberti[d], A. Tamburro[d], A. Toscano[c], A. Ranavolo[a]
[a]INAIL, Monte Porzio Catone, Italy; [b]IIT, Genova, Italy; [c]Centro Protesi INAIL, Rome, Italy; [d]ASL Roma 2, Rome, Italy.

Evaluation of WIMU sensor performance in estimating running stride time and vertical stiffness: a comparison with smart pressure insoles
S. Pinelli[a], M. Mandorino[b], M. Lacome[b], S. Fantozzi[c]
[a]Department for Life Quality Studies, University of Bologna, 47921 Corso D'Augusto 237, Rimini, Italy; [b]Performance and Analytics Department, Parma Calcio 1913, Parma, Italy; [c]Department of Electrical, Electronic, and Information Engineering "Guglielmo Marconi", University of Bologna, Bologna, Italy

Effects of acoustic and visual stimuli on Countermovement jump performance in volleyball players evaluated by Inertial Measurement Unit

C.I. De Girolamo [a], A. Fullin [a], M. Trucillo [b], A. Lucariello [c], A. De Luca [b], P. De Blasiis [d]
[a] Department of Advanced Biomedical Sciences, University of Naples "Federico II", Naples, Italy; [b] Department of Mental and Physical Health and Preventive Medicine, Section of Human Anatomy, University of Campania "Luigi Vanvitelli", Naples, Italy; [c] Department of Sport Sciences and Wellness, University of Naples "Parthenope", 80100, Naples, Italy; [d] School of Engineering, University of Basilicata, 85100 Potenza, Italy

Estimation of joint moments during ball throwing in simulated altered gravity conditions using a musculoskeletal modelling approach: preliminary results

A. Pica[a], I.G. Porco [a], E. Zimei [a], E. Braccili [a], S.M.G. Solinas [a], P. Picerno [a], U. Della Croce [a]
[a] Department of Biomedical Sciences, University of Sassari, Sassari, Italy

10.15   LEZIONE MAGISTRALE 2
Chair: Andrea Cereatti

The global-local dilemma in rehabilitation. Does attention to detail prevent consideration of the person?

Prof. Derick Wade
Consultant in Neurological Rehabilitation and Visiting Professor at Oxford Brookes University, UK

Discussione

11.15   Coffee break

11.45   PRESENTAZIONI ORALI 2
Innovations in Mobility Assessment
Chairs: Ilaria Arcolin, Roberto Di Marco

Influence of walking path length on 2-minute walk test gait parameters in healthy young adults

C. Lo Zoppo [a], V. Belluscio [a], G. Vannozzi [a]
[a] University of Rome "Foro Italico", Rome, Italy

From development to deployment: introducing MobGap, the open-source tool for mobility assessment with wearable devices by Mobilise-D

P. Tasca [a], A. Küderle [b], C. Kirk [c], C. Hinchcliffe [c], D. Megaritis [d], A. Stihi [e], B. Caulfield [f], L. Rochester [c], A. Cereatti [a]
[a] Politecnico di Torino, Turin, Italy; [b] Friedrich-Alexander-Universität, Erlangen-Nuremberg, Germany; [c] Newcastle University, Newcastle, United Kingdom; [d] Northumbria University Newcastle, Newcastle, United Kingdom; [e] University of Sheffield, Sheffield, United Kingdom; [f] University College Dublin, Dublin, Ireland

Instrumented Timed Up and Go Test: a reliable tool for elderly with femur fracture

S. Baracco [a], I. Arcolin [a], S. Corna [a], M. Godi [a], M. Giardini [a]

[a] Istituti Clinici Scientifici Maugeri IRCCS, Department of Physical and Rehabilitation Medicine Unit, Institute of Veruno, Italy

Validation of a new method for center of mass trajectory estimation in simulated daily life activities based on inertial and barometric pressure data fusion

A. Audisio [a], D. Fortunato [a], P. Tasca [a], M. Caruso [a], A. Cereatti [a]

[a] Polytechnic University of Turin

Reliability of average daily steps measured through a consumer smartwatch in people with Parkinson's disease across disease severity and subtypes

E. Bianchini [a,b], D. Rinaldi [a], P. Pacilio [a], C. Hansen [c], F.E. Pontieri [a], N. Vuillerme [b,d]

[a] Department of Neuroscience, Mental Health and Sensory Organs (NESMOS), Sapienza University of Rome, Rome, Italy; [b] AGEIS, Université Grenoble Alpes, Grenoble, France; [c] Department of Neurology, Kiel University, Kiel, Germany; [d] Institut Universitaire de France, Paris, France

Clinical and instrumental gait phenotyping in subjects with GLUT-1 deficiency syndrome

I. Campese [a], M. Corrado [a,b], V. Grillo [a,b], B. Agostini [a,b], V. Vacchini [c], C. Varesio [a,c], M. Celario [a,c], D. Trabassi [d], S.F. Castiglia [a,d], M. Serrao [d], C. Tassorelli [a,b], V. De Giorgis[a,c], R. De Icco [a,b]

[a] Movement Analysis Research Section, IRCCS Mondino Foundation, Pavia, Italy; [b] Department of Brain and Behavioral Sciences, University of Pavia, Pavia, Italy; [c] Department of Child Neurology and Psychiatry, IRCCS Mondino Foundation, Pavia, Italy; [d] Department of Medical and Surgical Sciences and Biotechnologies, "Sapienza" University of Rome, Polo Pontino, Latina, Italy

A graph-based approach to study motor coordination in Parkinson's Disease gait: a longitudinal study to assess the effectiveness of Deep Brain Stimulation neurosurgery

L. Locoratolo [a], M. Ghislieri [a], F. Sciscenti [a], M. Lanotte [b], L. Rizzi [b], V. Agostini [a]

[a] PolitoBIOMed Lab, Dept. of Electronics and Telecommunications, Politecnico di Torino, Turin, Italy; [b] Department of Neuroscience "Rita Levi Montalcini", University of Turin, Turin, Italy

13.15   Light lunch

14.15 **LEZIONE MAGISTRALE 3**
Chair: Rita Stagni

Beyond Markers: Unveiling Human Motion Through Markerless Video Analysis

Prof.ssa Maura Casadio
Associate Professor in Biomedical Engineering at the University of Genoa, Italy

Discussione

15.15 **Poster Metodologici 1**
Chairs Panic Session: Elena Bergamini, Simone Guglielmetti

ID#1 **Design and validation of a novel accelerometer-based test for the assessment of the sensorimotor control of the shoulder**
<u>P. Picerno</u> [a], M. Bravi [b], F. Santacaterina [c], E. Iuliano [d], M. Germanotta [e]
[a] Department of Biomedical Sciences, University of Sassari; [b] Rehabilitation Unit, Campus Bio-Medico University Hospital Foundation; [c] Department of Engineering, Campus Bio-Medico University of Rome; [d] "e-Campus" Online University; [e] IRCCS Don Carlo Gnocchi Foundation

ID#2 **Upper limb muscle synergies in people with Poland syndrome**
<u>V. Illiano</u> [a], C. Pierella [b], V. Anfossi [c,d], F. Cotellessa [d], L. D'Angelo [d,e], D. Del Chiaro [d,e], C. Martinoli [h,i], M. Moro [a,b,c], M. Pedemonte [a], S. Strano [d,e], I. Baldelli [f,g], M. Casadio [a,b], L. Mori [d,e]
[a] Department of Informatics, Bioengineering, Robotics and Systems Engineering (DIBRIS), University of Genova, Genova, Italy; [b] RAISE Ecosystem, Genoa, Italy; [c] Machine Learning Genoa (MaLGa) Center; [d] IRCCS Ospedale Policlinico San Martino, 16132 Genoa, Italy; [e] Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health, University of Genoa, 16132 Genoa, Italy; [f] Department of Surgical Sciences and Integrated Diagnostics (DISC), University of Genoa, Genoa, Italy; [g] Division of Plastic and Reconstructive Surgery, IRCCS Ospedale Policlinico San Martino, Genoa, Italy; [h] Department of Radiology-III, IRCCS AOU San Martino-IST; [i] University of Genoa, Genoa, Italy

ID#4 **Application of dynamic time warping to Fragile X syndrome's gait patterns: a supervised approach**
<u>F. Beghetti</u> [a], D. Varagnolo [a,b], F. Spolaor [c], A. Guiotto [a], E. DiGiorgio [c], V. Liani [c], R. Polli [c], A. Murgia [c], Z. Sawacha [a]
[a] Department of Information Engineering, University of Padua, Padua, Italy; [b] Department of Engineering Cybernetics, Norwegian University of Science and Technology, Trondheim, Norway; [c] Department of Women's and Children's Health, University of Padua, Padua, Italy

ID#5 **An automatic anthropometric model generation tool for scalable human whole-body musculoskeletal modeling**
<u>L. Fiori</u> [a,b], C. Latella [a,b], A. Tatarelli [a,b], D. Pucci [a,b,c]
[a] AMI, Istituto Italiano di Tecnologia, Genoa, Italy; [b] RAISE Ecosystem, Genoa, Italy; [c] School of Computer Science, University of Manchester, UK

ID#8 **Observational pilot study of the correlation between indices deriving from the acceleration of trunk and emg parameters of the muscles in the lower limb**

D. Massarelli [a], A. Marsocci [a], F. Curti [a], F. Magnifica [a]
[a] La Sapienza, Rome, Italy

ID#10 **Within-session variability of different gait quality indices in neurological disorders**

A.S. Orejel Bustos [a,b], M. Tramontano [c], P. Brasiliano [b], V. Belluscio [a,b], S. Vasta [d], G. Marangon [e], E. Bergamini [b,f], G. Vannozzi [a,b]
[a] IRCCS Santa Lucia Foundation, Rome, Italy; [b] Department of Movement, Human and Health Sciences, University of Rome "Foro Italico", Rome, Italy; [c] Department of Biomedical and Neuromotor Sciences - DIBINEM, Alma Mater Università di Bologna, Bologna, Italy; [d] Department of Cognitive, Psychological, Pedagogical Sciences and Cultural Studies - COSPECS, University of Messina, Messina, Italy; [e] Department of Neuroscience, Imaging and Clinical Sciences, University of Chieti-Pescara, Chieti, Italy; [f] Department of Management, Information and Production Engineering, University of Bergamo, Dalmine, Bergamo, Italy

ID#14 **Assessment of Quantitative Metrics for Spontaneous Movement Analysis Using a Single RGB-D Camera: A Case Study of Twins with Divergent Health Profiles**

D. Balta [a], I.G. Porco [b], H. Hoang [c], M.M. Schladen [c], A. Cereatti [a], P.S. Lum [c], U. Della Croce [b,c]
[a] Politecnico di Torino, Torino, Italy; [b] University of Sassari, Sassari, Italy; [c] The Catholic University of America, Washington DC, United States of America

ID#16 **A method for mechanical crosstalk rejection and running event detection on a 9-force plates instrumented track**

R. Di Marco [a], G. Zullo [b], S.G. Breban [b], A.G. Cutti [c], N. Petrone [b]
[a] Department of Engineering for Innovation Medicine, University of Verona, Verona, Italy; [b] Department of Industrial Engineering, University of Padova, Padova, Italy; [c] Centro Protesi, INAIL, Vigorso, Italy

ID#17 **Reliability of a 3D Model-Based Marker-less Approach for Clinical Gait Analysis with a Single RGB-Depth Camera**

D. Balta [a], J. Riad [b], U. Della Croce [c], A. Cereatti [a]
[a] Politecnico di Torino, Torino, Italy; [b] University of Gothenburg, Gothenburg, Sweden; [c] University of Sassari, Sassari, Italy

ID#18 **Gait initiation, a phase transition containing rehabilitative information**

M. Petrarca [a], M. Favetta [a], A. Speroni [a], J. Iovalè [a], P. Tavassi [a], G. Della Bella [a], D. Lettori [a]
[a] Movement Analysis and Robotics laboratory (MARlab), Bambino Gesù Children's Hospital, IRCCS, Rome Italy

ID#21 **IMU-based ambulatory pre-surgical assessment of Spinal Decompressive Surgery**

R. Stagni [a], A. Pasotti [a,b], L.E. Noli [b], E. Serchi [b], C. Griffoni [c], M.C. Bisi [a], L. Cristofolini [a], G. Barbanti Brodano [c], A. Conti [b,d]
[a] DEI, University of Bologna, Italy; [b] Department of Neurosurgery, IRCCS Istituto delle Scienze Neurologiche di Bologna, Italy; [c] Department of Spine Surgery, IRCCS Istituto Ortopedico Rizzoli, Italy; [d] DIBINEM, University of Bologna, Italy

ID#22 **Anterior cruciate ligament injury prevention and recovery: towards an ecological assessment of knee stability**

A. Baldazzi [a], R. Borzuola [a], L. Rum [b], S. Della Rocca [a], J. Jacques [c], H. Pillet [d], A. Macaluso [a], F. Margheritini [a], E. Bergamini [e]

[a] Università degli Studi di Roma "Foro Italico", Rome, Italy; [b] Università degli Studi di Sassari, Sassari, Italy; [c] National Institute of Applied Sciences of Toulouse, Toulouse, France; [d] Arts et Métiers ParisTech, Paris, France; [e] Università di Bergamo, Bergamo, Italy

ID#31 **Predicting ACL and PCL overloading for injury prevention through a 6DOF knee EMG-driven model**

G. Rigoni [a], M. Dalle Vacche [a], F. Spolaor [a], D. Pavan [a], Z. Sawacha [a]

[a] Università degli Studi di Padova

ID#32 **Reliability assessment of a 3D markerless body pose estimation in children with and without applying a multi camera triangulation algorithm**

G. Rigoni [a], A. Guiotto [a], F. Spolaor [a], Z. Sawacha [a]

[a] Università degli Studi di Padova

ID#36 **Markerless estimation of sit-to-stand kinematics through an optimized DeepLabCut model**

D. Milone [a], L. D'Agati [a], F. Longo [a], G. Merlino [a], G. Risitano [a], C. De Marchis [a]

[a] Department of Engineering (DI), University of Messina, Contrada di Dio, Messina, 98166, Italy

ID#37 **The mnesys-cmsyn study: exploring cortico-muscular coherence during hand and upper limb movements**

G. Lomele [a], T. Lencioni [a], A. Comanducci, M. Cabinio [a], A. Marzegan [a], J. Jonsdottir [a], M. Rabuffetti [a], L. Fornia [a,b], M. Ferrarin [a]

[a] IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy; [b] Università degli studi di Milano – La Statale, Milan, Italy

ID#40 **A 'Fingerprint' of fine motor control maturation: motor development descriptors and reference development bands in primary school children**

M.C. Bisi [a], R. Stagni [a]

[a] Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione "Guglielmo Marconi" – DEI, Università di Bologna, Bologna, Italy

ID#41 **Anticipatory postural adjustments for reaching and lifting an object from the floor**

P. Di Florio [a], M. Sicbaldi [b], L. Palmerini [b], A. Silvani [a], L. Chiari [b]

[a] University of Bologna, Department of Biomedical and Neuromotor Sciences; [b] University of Bologna, Department of Electrical, Electronic and Information Engineering

ID#42 **COM velocity estimation with wearable sensors during reaching and lifting an object from the floor**

P. Di Florio [a], M. Sicbaldi [b], L. Palmerini [b], A. Silvani [a], L. Chiari [b]

[a] University of Bologna, Department of Biomedical and Neuromotor Sciences; [b] University of Bologna, Department of Electrical, Electronic and Information Engineering

ID#44 **Reliability assessment of IMU-driven inverse kinematics in Opensim: a proof of concept**

M. Dalle Vacche [a], G. Rigoni [a], A. Lazzarini [a], A. Guiotto [a], F. Spolaor [a], Z. Sawacha [a]
[a] University of Padova, Padova, Italy

ID#46 **Optimized Gait Classification in Hereditary Cerebellar Ataxia via AI-Driven Data Balancing Methods**

D. Trabassi [a], S.F. Castiglia [a,b], F. Bini [c], F. Marinozzi [c], A. Ajoudani [d], M. Lorenzini [d], I. Gennarelli [d], A. Ranavolo [e], C. Tassorelli [b,f], R. De Icco [b,f], C. Casali [a], M. Serrao [a]
[a] Department of Medical and Surgical Sciences and Biotechnologies, "Sapienza" University of Rome, Latina, Italy; [b] Department of Brain and Behavioral Sciences, University of Pavia, Pavia, Italy; [c] Department of Mechanical and Aerospace Engineering, Sapienza University of Rome, Rome, Italy; [d] HRI2 Laboratory, Istituto Italiano di Tecnologia, Genoa, Italy; [e] Department of Occupational and Environmental Medicine, Epidemiology and Hygiene, INAIL, Rome, Italy; [f] Headache Science & Neurorehabilitation Unit, IRCCS Mondino Foundation, Pavia, Italy

ID#47 **Characterization of upper-limb biomechanics during center-out reaching task: preliminary results of motor learning during repeated execution in a single training session**

M. Lubrano [a], M.C. Bisi [a], S. Fantozzi [a], R. Stagni [a]
[a] University of Bologna, Bologna, Italy

ID#53 **Comparison of inertial-based filters for orientation estimation in indoor and outdoor running**

A. Machetti [a], R. Rossanigo [b,c], M. Caruso [a], G. Martinez [b], L. Ventura [b], A. Manca [b], F. Deriu [b,d], A. Cereatti [a]
[a] Department of Electronics and Telecommunications, Politecnico di Torino, Turin, Italy; [b] Department of Biomedical Sciences, University of Sassari, Italy; [c] NeuroRehab Research Center, Lausanne University Hospital (CHUV), Lausanne, Switzerland; [d] Unit of Endocrinology, Nutrition, and Metabolic Disorders, AOUSS, Sassari, Italy

ID#62 **Capturing gait signature: a biomechanically driven marker-less approach based on multiple RGB cameras**

B. Sabbadini [a], D. Balta [a], P. Tasca [a], A. Cereatti [a]
[a] Polytechnic University of Turin, Turin, Italy

ID#69 **Real-world gait detection with a head-worn inertial unit and features-based machine learning**

P. Tasca [a], F. Salis [b], A. Cereatti [a]
[a] Politecnico di Torino, Turin, Italy; [b] University of Sassari, Sassari, Italy

ID#72 MOVEWISE (mobility observation via wearable integrated sensor evaluation): a multicentric, prospective, observational, and longitudinal study

M. Caruso[a], D. Vecchio[b], V. Agostini[a], M. Boldreghini[c], A. Canale[c], M. Canonico[d], M. Clerico[e], L. Cosenza[f], G. Olmo[g], S. Polidoro[h], L. Priano[i,j], S. Rolla[e], A. Dal Molin[h], A. Cereatti[a]

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ID#73 Development and validation of an algorithm based on ankles-IMU setup for the extraction of gait parameters

G. Prisco[a], F. Mercaldo[a], A. Santone[a], F. Esposito[b], F. Amato[c], M. Cesarelli[d], L. Donisi[b]

[a] University of Molise, Campobasso, Italy; [b] University of Campania Luigi Vanvitelli, Naples, Italy; [c] University of Naples Federico II, Naples, Italy; [d] University of Sannio, Benevento, Italy

ID#74 Quantitative Assessment of Early Stage Passive Rehabilitation through Kinematic Indices

G. Iaselli[a], G. Pagano[b], A. Coccia[a], F. Colelli Riano[a], A. Biancardi[a], F. Amitrano[a], G. D'Addio[a]

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ID#78 What is the minimum stiffness of dynamic AFOs for people with foot drop? A gait-analysis based dynamic study

G. Rogati[a], F. Beghetti[b], Z. Sawacha[b], A. Leardini[a], P. Caravaggi[a]

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ID#84 The RAISE-FitFES Project: usability and acceptability of a Functional Electro-stimulator controlled by electromyographic signal for post-stroke in-patients

G. Bailo[a], A. Di Meo[a], J. Jonsdottir[a], A. Romano[a], P. Balbi[a], R. Bertoni[a], P. Di Bello[b], T. Lencioni[a], F. Lucchetti[a], A. Marzegan[a], C. Trompetto[c], M. Semprini[b], M. Ferrarin[a]

[a] IRCCS Don Carlo Gnocchi Foundation, Milan, Italy; [b] Italian Institute, Genoa, Italy; [c] IRCCS San Martino Policlinico Hospital, Genoa, Italy

ID#87 **A Deep Learning approach based on a Convolutional Neural Networks architecture towards Abnormal Human Activity Recognition**

L. Palazzo [a,*], V. Suglia [b,*], G. Pagano [a], A. Passantino [c], G. D'Addio [a,d], V. Bevilacqua [b,e]
[a] Bioengineering Unit of Bari, Istituti Clinici Scientifici Maugeri IRCCS, Bari, Italy; [b] Department of Electrical and Information Engineering (DEI), Polytechnic University of Bari, Bari, Italy; [c] Cardiac Rehabilitation Unit of Bari, Istituti Clinici Scientifici Maugeri IRCCS, Bari, Italy; [d] Bioengineering Unit of Telese Terme, Istituti Clinici Scientifici Maugeri IRCCS, Telese Terme, Italy; [e] Apulian Bioengineering S.R.L., Modugno, Italy; * These authors equally contributed to this work.

ID#89 **Fall prevention and self-care in elderly: the FREECARE case study**

M.Ramaglia[a], M.Ramaglia[a], D.Giansanti[a], D.Palma[a], F.Amitrano[b], A.Coccia[b], G.D'Addio[b]
[a] Adiramef Group SpA; [b] Istituti Clinici Scientifici Maugeri IRCCS, Bioengineering Unit of Telese Terme, Italy

ID#92 **A motion capture protocol for the in-vivo assessment of running and long jumping biomechanics in transfemoral and transtibial running elite para-athletes**

R. Di Marco [a], S.G. Breban [b], G. Zullo [b], G.L. Migliore [c], F. Gariboldi [b], M. Scapinello [b], G. Marcolin [d], A.G. Cutti [c], N. Petrone [b]
[a] Department of Engineering for Innovation Medicine, University of Verona, Italy; [b] Department of Industrial Engineering, University of Padova, Italy; [c] Centro Protesi, INAIL, Vigorso, Italy; [d] Department of Biomedical Sciences, University of Padova, Italy

ID#95 **Muscle activation during Action Observation: experimental insights**

F.Verdini[a], A.Mengarelli[a], A.Tigrini[a], R.Mobarak[a], M.Scattolini[a], E.Pasquinelli[b], J.Brambatti[b], P.Casoli[b], S.Fioretti[a], L.Burattini[a], M.G.Ceravolo[b], M.G.Benedetti[c], M.Capecci[b]
[a] Dipartimento di Ingegneria dell'Informazione, Università Politecnica delle Marche, Ancona, Italia; [b] Dipartimento di Medicina Sperimentale e clinica, Università Politecnica delle Marche, Ancona, Italia; [c] Dipartimento di Scienze Biomediche e Neuromotorie, Università degli Studi di Bologna, Bologna, Italia

ID#96 **Continuous estimation of vertical ground reaction force during unconstrained walking by lower limb EMG recordings**

A.Mengarelli[a], A.Tigrini[a], F.Verdini[a], M.Scattolini[a], R.Mobarak[a], L.Burattini[a], S.Fioretti[a]
[a] Università Politecnica delle Marche, Ancona, Italy

ID#102 **Enhancing Injury Prevention and Performance Monitoring in Athletes through EMG Analysis**

J. Simeone [a], R. Zinni [a], F. Boldi [b], R. Oliveto [c]
[a] Datasound srl, Pesche (IS), Italy; [b] XEOS., Brescia, Italy; [c] University of Molise, Pesche (IS), Italy and Datasound srl, Pesche (IS), Italy

ID#105 **Softball players with shoulder injuries exhibit upper-body compensatory strategies compared to healthy controls: a wearable inertial sensors study**

R. Zinno [a], S. Di Paolo [b], M. Hoyaux [c], A. Minardi [a], L. Bragonzoni [a]
[a] Department for Life Quality Studies, University of Bologna, Rimini, Italy; [b] Orthopaedic and Traumatologic Clinic, IRCCS, Rizzoli Orthopaedic Institute, Bologna, Italy; [c] EPF Cachan School of Engineering, Cachan, France

ID#112   **Enhancing Motion Analysis in Medical Diagnostics through Explainable Artificial Intelligence**

R. Zinni [a,b], N. Balletti [c,d] J. Simeone [a], R. Oliveto [a,d]

[a] Datasound srl, Pesche (IS), Italy; [b] WordPower, San Salvo (CH), Italy; [c] Center for Biotechnology, Institute of Biomedical Sciences of the Ministry of Defense, Rome, Italy; [d] University of Molise, Pesche (IS), Italy

16.00   Coffee break

17.00   **PRESENTAZIONI ORALI 3**
Artificial Intelligence and Machine Learning in Clinical Assessment
Chairs: Fabiola Spolaor, Andrea Mannini

Predicting 60-day Recovery Outcomes After ACL Surgery Using Machine Learning

P. Liuzzi [a], E. Nesi [a], S. Campagnini [a], F. Mari [b], I. Dimauro [b], N. Carta [c], J. Rocchi [c], E. Bergamini [d], A. Mannini [a], P.P. Mariani [c]

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Deep learning algorithms for the recognition of human movements in work activities

A. De Rosa [a], L. Palazzo [a], T. Falcone [b], P. Lenzuni [c], G. D'Addio [a], V. Molinaro [d], A. Ranavolo [d], S. Del Ferraro [d]

[a] Istituti Clinici Scientifici Maugeri IRCCS, Bioengineering Unit of Telese Terme Institute, Italy; [b] Consiglio Nazionale delle Ricerche (CNR), Istituto per i Polimeri, Compositi e Biomateriali (iPCB), Italy; [c] INAIL-Direzione Regionale Toscana-Unità Operativa Territoriale di Firenze; [d] INAIL-Dipartimento di Medicina, Epidemiologia, Igiene del Lavoro e Ambientale-Laboratorio di Ergonomia e Fisiologia

Machine learning applied to gait analysis data in cerebral palsy and stroke: A systematic review

F. Samadi Kohnehshahri [a,b], A. Merlo [b], D. Mazzoli [b], M.C. Bò [b], R. Stagni [a]

[a] Department of Electronic and Information Engineering, University of Bologna, Italy; [b] Gait and Motion Analysis Laboratory OPA Sol et Salus, Torre Pedrera, Rimini, Italy

Locomotion characterization of stroke patients through machine learning and feature selection techniques

P. Brasiliano [a], V. Belluscio [a,b], A.S. Oreje Bustos [a,b], M. Tramontano [c], G. Vannozzi [a,b], E. Bergamini [d]

[a] Department of Movement, Human and Health Sciences, University of Rome "Foro Italico", Rome, Italy; [b] IRCCS Santa Lucia Foundation, Rome, Italy; [c] Department of Biomedical and Neuromotor Sciences - DIBINEM, Alma Mater Università di Bologna, Bologna, Italy; [d] Department of Management, Information and Production Engineering, University of Bergamo, Bergamo, Italy

AI-Enhanced Wearables: Transforming Parkinson's and Atypical Parkinsonism Diagnosis

I. D'Ascanio [a], **G. Lopane** [b], **I. Cani** [b,c], **L. Baldelli** [b,c], **G. Giannini** [b,c], **L. Chiari** [a,d], **P. Palmerini** [a,d]

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Muscle pre-activation prior to landing in athletes with anterior cruciate ligament reconstruction: detection of EMG onset using artificial intelligence

F. Russo [a], **M. Ghislieri** [a], **A. Baldazzi** [b], **L. Rum** [c], **E. Bergamini** [d], **V. Agostini** [a]

[a] Polytechnic University of Turin, Turin, Italy; [b] University of Rome "Foro Italico", Roma, Italy; [c] University of Sassari, Sassari, Italy; [d] University of Bergamo, Bergamo, Italy

Best task and best gait measure to identify de novo and moderate Parkinson's disease: a lesson learned from a machine learning point of view

V.A. Arcobelli [a], **P. Carlson-Kuhta** [b], **D. Enge l** [b], **P. Burgos** [b], **V.V. Shah** [b,c], **S. Mellone** [a], **L. Chiari** [a], **F.B. Horak** [b,c], **M Mancini** [b]

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18.30   Conclusione della giornata

Moderatori: Paolo De Blasiis, Monica Sicari

18.30 **Eterogeneità dei pattern di spasticità e approccio clinico-strumentale**

Paolo De Blasiis
Università degli Studi della Basilicata, Potenza

18.39 **Applicazione dell'analisi del movimento nel management della spasticità dell'arto superiore**

Michela Cosma
AOU di Ferrara – Cona (FE)

18.48 **Applicazione dell'analisi del movimento nel management della spasticità dell'arto inferiore**

Giulio Gasperini
U.O.C. Medicina Riabilitativa Villa Beretta
Ospedale Valduce Como

18.57 **Modelli per la valutazione della spasticità basati su analisi strumentale**

Andrea Merlo
Ospedale P.A. Sol et Salus, Torre Pedrera di Rimini
AUSL-IRCCS di Reggio Emilia

19.05 Discussione

19.15 **Conclusione**

08.00   Registrazione Congresso

08.45   **Saluti e apertura del Presidente del Congresso**

09.00   **PRESENTAZIONI ORALI 4**
Cutting-Edge Technologies in Rehabilitation
Chairs: Ilaria Giuseppina Porco, Andrea Caronni

Neuromotor recovery of walking in post-stroke individuals using TWIN-Acta-based robotic assisted gait training
T. Lencioni [a], P. Arcuri [a], G. Bailo [a], T. Bowman [a], I. Ceroni [b], A. Comanducci [a], P. Di Bello [b], J. Jonsdottir [a], F. Lucchetti [a], S. Scarpetta [b], S. Squartecchia [a], A. Torchio [a], M. Semprini [b], M. Ferrarin [a]
[a] IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy; [b] Istituto Italiano di Tecnologia, Genova, Italy

Gait Analysis in Patients Undergoing Rehabilitation after Soft Tissue Sarcoma Surgery. Preliminary results
M. Germanotta [a], F. Falchini [a], S. Valeri [b], B. Vincenzi [c], C. Pagnoni [b], M. Angelucci [b], M. Fiore [d], A. Gronchi [d], R. Passa [b], A. Valeri [e], M.C. Mauro [a], A. Fasano [a], A. Pavan [a], S. Lattanzi [a], L. Cortellini [a], I.G. Aprile [a]
[a] IRCCS Fondazione Don Carlo Gnocchi Onlus, Florence, Italy; [b] Fondazione Policlinico Universitario Campus Bio-Medico, Operative Research Unit of Soft-Tissue Sarcomas Surgery Department, Rome, Italy; [c] Fondazione Policlinico Universitario Campus Bio-Medico-, Operative Research Unit of Medical Oncology, Rome, Italy; [d] Fondazione IRCCS Istituto Nazionale dei Tumori, Department of Surgery, Milan, Italy; [e] University of Campus Bio-Medico, Operative Research Unit of Plastic- Reconstructive and Aesthetic Surgery, Rome, Italy

A mixed reality system for the evaluation of the effects of exoskeletons on cognitive load during manual handling task
E. Scalona [a], A. Piol [b], M.L. Cavallo [c], M. Mosso [b], F.B.G. Bushara [b], G. Valli [c], G. Rossetto [b], N. Pintori [c], L. Falciati [c], D. Brignani [c], F. Negro [c], N. F. Lopomo [d]
[a] Department of Medical and Surgical Specialties, Radiological Sciences, and Public Health, University of Brescia, Italy; [b] Department of Information Engineering, University of Brescia, Italy; [c] Department of Clinical and Experimental Sciences, University of Brescia, Italy; [d] Department of Design, Politecnico di Milano, Italy

Rehabilitation with kinematic biofeedback improves shoulder function in patients surgically treated for rotator cuff tear: indications from a randomized controlled trial
I. Parel [a], A. Padolino [a], V. Candoli [a], M.V. Filippi [a], G. Merolla [a], P. Paladini [a], S. Sanniti [a], A.G. Cutti [b]
[a] Laboratory of Biomechanics, Cervesi Hospital, Cattolica, Italy; [b] Motion Analysis Laboratory, INAIL Prostheses Center, Vigorso di Budrio, Italy

Identification of compensatory movements by a single low-cost inertial sensor during rehabilitation exercises

F. Caramia [a], E. Bellucci b, E. D'Angelantonio [c], L. Lucangeli [c], V. Camomilla [a]

[a] University of Rome "Foro Italico", Rome, Italy; [b] University of Tuscia, Viterbo, Italy; [c] Technoscience, Latina, Italy

Efficacy of telerehabilitation training in stroke patients: evaluation of gait parameters

C. Iacovelli [a], **S. Giovannini** [b], **L. Castelli** [b], **F. Bove** [a], **I. Scala** [a], A. Tomaino [a], **G. Salvatori** [a], **A. Bentivoglio** [a], **P. Calabresi** [a], **P. Caliandro** [a]

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10.15   **LEZIONE MAGISTRALE 4**
Chair: Andrea Pilotto

What can exercise offer to help gait and balance problems in Parkinson's Disease?

Prof.ssa Alice Nieuwboer
Full Professor in the Department of Rehabilitation Sciences at KU Leuven, Belgium

Discussione

11.15   Coffee break

11.45   **PRESENTAZIONI ORALI 5**
Exploring Neuromuscular Control and Balance
Chairs: Marica Giardini, Dante Trabassi

Compensation strategies during perturbed gait

M. Petrarca [a], **M. Favetta** [a], **S. Carniel** [a], **S. Gazzellini** [a], **A. Speroni** [a], **G. Della Bella** [a], **D. Lettori** [a], **S. Summa** [a], **A. Berthoz** [b]

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IMU-Based balance assessment as an alternative to gold standard COP-based posturography: are we there yet?

M.C. Bisi [a], **R. Stagni** [a]

[a] Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione "Guglielmo Marconi" – DEI, Università di Bologna, Bologna, Italy

Approximate bayesian computation and intermittent control model of balance maintenance: an attempt to "open the box" of neuromuscular control strategy in diabetic subjects with and without neuropathy

A. Tigrini [a], A. Mengarelli [a], F. Verdini [a], R. Mobarak [a], M. Scattolini [a], T. Nomura [b], R.A. Rabini [c], S. Fioretti [a], L. Burattini[a]

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Responsiveness to rehabilitation of local dynamic stability of the trunk in subjects with primary degenerative cerebellar ataxia

S.F. Castiglia [a], D. Trabassi [a], C. Conte [a], T. Varrecchia [c], G. Chini [c], A. Ranavolo [c], C. Casali [a], M. Serrao [a,d]

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Effects of fatigability induced by prolonged walking in people with Multiple Sclerosis: preliminary results on static and dynamic balance

I. Carpinella [a], R. Bertoni [a], R. Cardini [b], A. Tacchino [c], E. Grange [c], G. Brichetto [c, d], C. Solaro [e], M. Rovaris [a], M. Ferrarin [a], D. Cattaneo [a, b], E. Gervasoni [a]

[a] IRCCS Don Carlo Gnocchi Foundation, Milan, Italy; [b] University of Milan, Milan, Italy; [c] Italian Multiple Sclerosis Foundation (FISM), Genoa, Italy; [d] Italian Multiple Sclerosis Society (AISM), Genoa, Italy; [e] Galliera Hospital, Genoa, Italy

Investigating Muscle Coordination during Dynamic Functional Reach Assessment

I. Ceriello [a], R. Borzuola [a], L. Rum [b], V. Camomilla [a], A. Macaluso [a]

[a] University of Rome "Foro Italico", Rome, Italy; [b] University of Sassari, Sassari, Italy

Do people with persistent postural-perceptual dizziness really sway? An instrumental sensor-based study

D. Piatti [a], L. Casagrande Conti [a], G. Paolocci [a, b], E. Bergamini [c], L. Manzari [d], G. Attanasio [e], I. Indovina [a, b], M. Tramontano [f,g]

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13.15   Light lunch

14.15   **TAVOLA ROTONDA E DIBATTITO CON OSPITI**
Chair: Francesco Di Nardo

Dott.ssa Isabella Campanini
Prof. Stefano Mazzoleni
Dott. Giancarlo Rovere
Prof. Mariano Serrao

15.15   **Poster Clinici**
*Chairs Panic Session: Amaranta Soledad Orejel Bustos,
Pietro Picerno*

ID#3   **Virtual Reality and Mirror Therapy during Upper Limb Movements. An EEG Study**
M. Capecci [a], N. Baldini [a], F. Annunzi [a], A. Antoniello [a], M.G. Ceravolo [a]
[a] *Dipartimento di Medicina Sperimentale e Clinica, Università Politecnica delle Marche, Ancona, Italy.*

ID#6   **Assessing gait impairments in neurological populations: a preliminary study of an ecological protocol**
A. Rossi [a], A.S. Orejel Bustos [a,b], L. Rum [c], A. Manzo [b], M.G. Buzzi [b], G. Vannozzi [a,b], V. Belluscio [a,b]
[a] *Department of Movement, Human and Health Sciences, University of Rome "Foro Italico", Rome, Italy;* [b] *IRCCS Santa Lucia Foundation, Rome, Italy;* [c] *University of Sassari, Sassari, Italy*

ID#7   **Assessment of erector spinal muscles activation in pre and post training with surface electromyography in an equestrian athlete with recurring non-specific low back pain**
F. Curti [a], A. Marsocci [a], D. Massarelli [a], F. Magnifica [a]
[a] *Sapienza University, Rome, Italy*

ID#12   **Do feet position and visual target distance affect postural stability and body weight distribution in healthy subjects?**
P. De Blasiis [a], A. Fullin [b], C.I. De Girolamo [b], P. Caravaggi [c], P. Arpaia [d], A. De Luca [e]
[a] *School of Engineering, University of Basilicata, 85100 Potenza, Italy;* [b] *Department of Advanced Biomedical Sciences, University of Naples "Federico II", 80131 Naples, Italy;* [c] *Movement Analysis Laboratory, IRCCS Istituto Ortopedico Rizzoli, 40136, Bologna, Italy;* [d] *Department of Electrical Engineering and Information Technologies, University of Naples Federico II, 80138 Naples, Italy;* [e] *Department of Mental and Physical Health and Preventive Medicine, Section of Human Anatomy, University of Campania "Luigi Vanvitelli", Naples, Italy*

ID#13   **Effects of a wearable device (Q-walk) for gait retraining in Parkinson's disease**
F. Spolaor [a], G. Rigoni [b], A. Guiotto [b], F. Cibin [c], Rizzetto [d], Z. Sawacha [b], D. Volpe [d]
[a] *Department of Women's and Children's Health, University of Padova, Padova;* [b] *Department of Information Engineering, University of Padova, Padova;* [c] *BBSoF srl. Via della Croce Rossa 112, 35129, Padova;* [d] *Fresco network of excellence, Villa Margherita Parkinson Centre, Vicenza*

ID#19 **Motor control hypothesis embedded in the controller of robotic knee orthosis**

M. Petrarca [a], M. Bottoni [a], M. Favetta [a], A. Speroni [a], P. Tavassi [a], J. Lovalè [a], G. Della Bella [a]

[a] *Movement Analysis and Robotics laboratory (MARlab), Bambino Gesù Children's Hospital, IRCCS, Rome Italy*

ID#24 **Age-related differences in mechanical fatigue and spatial EMG distribution of vastus lateralis muscle during dynamic contractions in old trained, old untrained, and middle-aged people**

M. Carbonaro [a], I. Gennarelli [a], C. Brusco Müller [b], I. Baltasar-Fernandez [c], J. Alcazar [c], F. Lauretani [d], M. Franchi [b], S. Porcelli [e], A. Botter [a]

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ID#25 **The effect of functional electrical stimulation on freezing of gait in people with parkinsons' disease: a pilot study**

L. Bellotti [a], S. Marcu [b], A. Marzegan [c], I. Bersch [d], A. Castagna [c]

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ID#26 **Assessing lower limb coordination during heel strike in Parkinson disease patients**

R. Minino [a], E. Troisi Lopez [b], A. Romano [a], P. Sorrentino [c], G. Sorrentino [a]

[a] *University of Naples Parthenope;* [b] *Institute of Applied Sciences and Intelligent Systems, National Research Council, Pozzuoli, Italy;* [c] *Institut de Neurosciences des Systèmes, Aix-Marseille Université, Marseille, France*

ID#28 **Instrumental static balance assessment of patients with Parkinson's disease and Parkinsonism for clinical applications: a systematic review**

L. Cavazzuti [a], M.C. Bò [a], M.C. Bassi [b], F. Cavallieri [c], F. Valzania [c], G. Di Rauso [c], G. Portaro [c], V. Fioravanti [c], B. Damiano [a], S. Scaltriti [a], A. Merlo [a], I. Campanini [a]

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ID#29 **The role of an explicit strategy in muscle synergy recruitment and structure during adaptation to virtual surgeries**

D. Borzelli [a,b], P. De Pasquale [c], S. Gurgone [d], M. Mezzetti [e], A. Quercia [a], D.J. Berger [b,f], L.R. Dal Bello [b], A. d'Avella [b,g]

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ID#38 **Sex differences in motor unit behavior in young, middle-aged and old adults during moderate isometric contractions**

M. Boccardo [a], M. Carbonaro [a], C. Brusco Müller [b], F. Lauretani [c], S. Porcelli [d], M.V. Franchi [b], A. Botter [a]

[a] LISiN, Department of Electronics and Telecommunication, Politecnico di Torino, Torino, Italy; [b] Department of Biomedical Sciences, University of Padova, Padova, Italy; [c] Geriatric Clinic Unit, Medical Geriatric Rehabilitative Department, University Hospital of Parma, Parma, Italy; [d] Department of Molecular Medicine, University of Pavia, Pavia, Italy

ID#43 **The effects of hyaluronic acid on kinematic gait parameters in patients with knee osteoarthritis: a systematic literature review**

C. Costantino [a], S. Ronzoni [a], A. Ingletto [a], R. Sabato [a], S. Palermi [b], A. Frizziero [a,c], A. Demeco [a]

[a] Department of Medicine and Surgery, University of Parma, 43126 Parma, Italy; [b] Public Health Department, University of Naples Federico II, 80131 Naples, Italy; [c] ASST "Gaetano Pini" CTO; 20122 Milano, Italy

ID#50 **Evaluation of relationship between neuro-muscular fatigue and manual dexterity in physiotherapists: an observational study**

F. Phan [a], G. Libiani [b], A. Coda [c], F. Sartorio [a,b]

[a] Department of Scientific Research Campus LUdeS Lugano (CH), Off-Campus Semmelweis University of Budapest, Hungary; [b] Istituti Clinici Scientifici Maugeri IRCCS, Department of Physical and Rehabilitation Medicine Unit, Institute of Veruno, Italy; [c] Self-employed physiotherapist, Italy

ID#51 **iTUG variables as predictors of falls in older people after femur fracture**

V. Passoni [a], M. Giardini [a], I. Arcolin [a], S. Guglielmetti [a], S. Corna [a], M. Godi [a]

[a] Istituti Clinici Scientifici Maugeri IRCCS, Department of Physical and Rehabilitation Medicine Unit, Institute of Veruno, Italy

ID#63 **Integrated instrumental evaluation of the upper limb in the rehabilitation process in children with neuromotor disabilities**

F. Oppia [a], V. Gasparroni [b], D. Conte [c], M. Lustro [a], M. Cozzi [a], A. Martinuzzi [a]

[a] Scientific Institute, IRCCS E. Medea, Conegliano, Treviso, Italy; [b] Scientific Institute, IRCCS E. Medea, Pasian di Prato, Udine, Italy; [c] University of Verona, Verona, Italy

ID#64 **Obesity effects on young adults' gait pattern after five years from Sleeve Gastrectomy**

M. Favetta [a], S. Summa [a], O. Adorisio [b], R. Caccamo [b], G. Della Bella [a], F. De Peppo [b], E. Castelli [a], M. Petrarca [a]

[a] Movement Analysis and Robotics Laboratory (MARlab), Neurorehabilitation Unit, Bambino Gesù Children's Hospital, IRCCS, Rome, Italy; [b] Pediatric Surgery Unit, Bambino Gesù Children's Hospital, IRCCS, Rome, Italy

ID#66 **Gender differences in ankle kinematic during a change of direction in U18 basketball players**

L. Bragonzoni [a], S. Pinelli [a], S. Di Paolo [b], A. Jodar-Portas [c], F. Vasileva [c], R. Font-Lladó [d], A. Fort-Vanmeerhaeghe [d], R. Zinno [a]

[a] Department for Life Quality Studies, University of Bologna, Rimini, 47921, Italy; [b] 2nd Orthopaedic and Traumatologic Clinic, IRCCS, Rizzoli Orthopaedic Institute, Bologna, 40136, Italy; [c] University School of Health and Sport (EUSES), University of Girona, Girona, Spain; [d] Department of Sports Science, Ramon Llull University, Barcelona, Spain

ID#67 **Enhancing soccer athletes' performance: a kinematic analysis of agility training**

L. Bragonzoni [a], S. Pinelli [a], M. Verduschi [a], R. Zinno [a]

[a] Department for Life Quality Studies, University of Bologna, Rimini, 47921, Italy

ID#68 **TWIN-Acta controlled exoskeleton in gait rehabilitation for persons post-stroke. A pilot and feasibility study**

J. Jonsdottir [a], T. Bowman [a], A. Torchio [a], T. Lencioni [a], A. Romano [a], A. Di Meo [a], G. Bailo [a], P. Di Bello [b], I. Ceroni [b], S. Maludrotti [b], S. Scarpetta [b], L. De Michieli [b], M. Semprini [b], M. Ferrarin [a]

[a] IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy; [b] Istituto Italiano di Tecnologia, Genova, Italy

ID#77 **The feasibility study of EMG- and kinematics-based assessment and future directions for the Othello project**

F. Lucchetti [a], G. Bailo [a], I. Carpinella [a], R. Bertoni [a], M. Bianco [a], M. Cabinio [a], R. Cardini [b], L. Fornia [a,c], A. Nuara [d], F. Rossetto [a], A. Viganò [a], M. Ferrarin [a], T. Lencioni [a]

[a] IRCCS Fondazione Don Carlo Gnocchi ONLUS, Milan, Italy; [b] Department of Pathophysiology and Transplantation, University of Milan, Milan, Italy; [c] Department of Medical Biotechnology and Translational Medicine, University of Milan, Milan, Italy; [d] Neuroscience Unit, Medicine and Surgery Department, University of Parma, Parma, Italy

ID#80 **Assessing upper limb motor impairments in post-stroke patients using optoelectronic and electromyographic systems during the Action Research Arm Test**

G. Bailo [a], F. Lucchetti [a], R Bertoni [a], M. Cabinio [a], A. Nuara [b], F. Rossetto [a], A. Viganò [a], I. Carpinella [a], T. Lencioni [a], M. Ferrarin [a]

[a] IRCCS Don Carlo Gnocchi Foundation, Milan, Italy; [b] Neuroscience Unit, Medicine and Surgery Department, University of Parma, Parma, Italy

ID#81 **Gait analysis in the evaluation of cancer-related fatigue. A literature review**

D. Coraci [a], C. Pavese [b], M.C. Maccarone [a], G. Dazzi [a], M. Mirando [b], G. Rossi [b], P. Contessa [a], A. Nardone [b], S. Masiero [a]

[a] Department of Neuroscience, University of Padova, Padua, Italy; [b] Department of Clinical-Surgical, Diagnostic and Pediatric Sciences, University of Pavia, Pavia, Italy

ID#85 **Ankle foot orthosis for children with cerebral palsy: what impact on participation?**

D. Pandarese [a], C. Borghi [a], S. Aime [a], C. Schito [a], S. Faccioli [a], S. Sassi [a]
[a] Children Rehabilitation Unit of Santa Maria Nuova Hospital, Azienda USL-IRCCS di Reggio Emilia, Reggio Emilia, Italy

ID#88 **Kinematic data after Latarjet procedure with or without cutting the pectoralis minor muscle in young patients: observational study at 6 month follow-up**

E. Giannotti [a], I. Parel [b], A. Padolino [c], S. D'Andreamatteo [a], G. Merolla [c], P. Paladini [c]
[a] Functional Recovery and Rehabilitation Unit, AUSL della Romagna, Rimini, Italy; [b] Laboratory of Biomechanics "M. Simoncelli", Cervesi Hospital, Cattolica, Italy; [c] Unit of Shoulder and Elbow Surgery, Cervesi Hospital, Cattolica, Italy; [c] Unit of Shoulder and Elbow Surgery, Cervesi Hospital, Cattolica, Italy

ID#91 **Analysis of head-trunk movements during gait in healthy and multiple sclerosis subjects: a systematic review**

J. Pollet [a], A. Di Meo [a], F.G. Mestanza Mattos [b], D. Cattaneo [a,b], A. Torchio [a], R. Buraschi [a], E. Gervasoni [a]
[a] IRCCS Fondazione Don Carlo Gnocchi, Milan, Italy; [b] Università degli Studi di Milano, Milan, Italy

ID#93 **Gait, posture, and upper limb bradykinesia responsiveness to subthalamic deep brain stimulation and levodopa in patients with Parkinson's disease using digital technology**

I. D'Ascanio [a], I. Cani [b,c], L. Baldelli [b,c], G. Lopane [b], S. Ranciati [d], P. Mantovani [b], A. Conti [b], P. Cortelli [b,c], G. Calandra-Bonaura [b,c], L. Chiari [a,e], G. Giannini [b,c], P. Palmerini [a,e]
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ID#99 **TrainAR project: integrating AR technology with wearable physiological signals monitoring for personalized physical training programs**

C. Occhipinti [a], I. Bejaoui [b], P. Picerno [a], S.M.G. Solinas [a], U. Della Croce [a], C. De Marchis [b]
[a] University of Sassari, Sassari, Italy; [b] University of Messina, Messina, Italy

ID#104 **Outpatient rehabilitation in a chronic stroke patient focused on motor control: the significant support of motion analysis**

G. Dazzi [a], D. Coraci [a], P. Contessa [b], V. Lazzar [b], M. De Gregorio [b], S. Masiero [a]
[a] University of Padova, Padova, Italy; [b] University Hospital Padua, Padua, Italy

ID#106 **Comparison of knee joint kinematics between generic and sport-specific agility tests in youth basketball players**

R. Zinno [a], S. Pinelli [a], S. Di Paolo [b], A. Jòdar-Portas [c], A. Prats-Puig [c], L. Bragonzoni [a]
[a] Department of Life Quality Studies, University of Bologna, 47921 Rimini, Italy; [b] 2nd Orthopaedic and Traumatologic Clinic, IRCCS, Rizzoli Orthopaedic Institute, Bologna, Italy; [c] University School of Health and Sport (EUSES), University of Girona, Girona, Spain

ID#108 **Whole-body cryostimulation (WBC) to improve trunk mobility in individuals with fibromyalgia and comorbid obesity: preliminary results**

<u>S. Cerfoglio</u> [a,b] , F. Verme [b], J.M. Fontana [b], A. Alito [c], M. Galli [a], P. Capodaglio [b,d], V. Cimolin [a,b]

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ID#116 **How non-specific low back pain affects gait kinematics: a systematic review and meta-analysis**

<u>F. Dal Farra</u> [a], N. Lopomo [b], M. Fascia [a], E. Scalona [c], V. Cimolin [d]

[a] Dept. Information Engineering, University of Brescia, Brescia, Italy; [b] Dept. of Design, Politecnico di Milan; [c] Dept. of Medical and Surgical Specialties, Radiological Sciences and Public Health, University of Brescia, Brescia, Italy; [d] Department of Electronics, Information and Bioengineering, Politecnico di Milano, Milano, Italy

ID#119 **Biomechanical efficacy of botulinum toxin treatment on synergy between spine and lower limbs in camptocormia in Parkinson's disease**

<u>M. Bacchini</u> [a], G. Chiari [a], M. Rossi [a], C. Bacchini [a], V. Brambilla [a]

[a] Don Carlo Gnocchi Foundation - Onlus - S. Maria ai Servi Center, Parma, Italy

ID#121 **Postural responses induced by intermittent visual occlusions in young and older adults**

<u>S. Guarducci</u> [a], G. Panconi [b], V. Sorgente [b], L. Mucchi [a], D. Minciacchi [b], R. Bravi [b]

[a] Dept. of Information Engineering, Florence Univ., Florence, Italy; [b] Dept. of Experimental and Clinical Medicine, Florence Univ., Florence, Italy

ID#122 **Monitoring the insurgence of involuntary muscle activity and the development of spasticity after an ischemic stroke over a six-month period: a case study**

<u>L. Cavazzuti</u> [a], A. Merlo [a], B. Damiano [a], S. Scaltriti [a], M. Zedde [b], F. Valzania [b], M. Lusuardi [c], I. Campanini [a]

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ID#123 **Assessing upper body compensatory movements in people with upper limb prosthetics using the Arm Profile Score: a preliminary evaluation on healthy subjects**

<u>E. Braccili</u> [a], L. Rum [a], E. Zimei [a], U. Della Croce [a], D. Anastasi [a]

[a] Università di Sassari, Sassari, Italy

ID#126 **A preliminary test to evaluate throwing performance in altered gravity conditions**

<u>I.G. Porco</u> [a], A. Pica [a], E. Zimei [a], E. Braccili [a], S.M.G. Solinas [a], P. Picerno [a], U. Della Croce [a]

[a] Department of Biomedical Sciences, University of Sassari, Sassari, Italy

ID#127 **Postural control during quiet stance with different sensory conditions among female adolescents with idiopathic scoliosis: preliminary results**

<u>A.C. Panara</u> [a], M. Mirando [b], L. Pedrotti [b,c], G. Rossi [a], C. Pezzi [a], M. Paramento [d,e], M. Rubega [d], E. Formaggio [d], E. Passarotto [d], P. Contessa [f], M.C. Maccarone [d,g], S. Masiero [d,f,g], A. Nardone [a,b]

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ID#128 **Balance and gait impairment in patients with cognitive decline in the elderly: a multidisciplinary assessment**

<u>G. Rossi</u> [a], M. Mirando [b], A.C. Panara [a], G. Topi [b], C. Fundarò [c], R. Zupo [a], F. Castellana [d], R. Sardone [e,f], A. Nardone [a,b], S. Natoli [b,g], C. Pavese [a,b]

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16.00   Coffee break

17.00   **PRESENTAZIONI ORALI 6**
Advanced Techniques in Movement Analysis
Chairs: Zimi Sawacha, Joel Pollet

Detecting co-contractions among multiple muscles: a time-frequency perspective

M. Morano [a], D. Borzelli [b], S. Fioretti [a], <u>F. Di Nardo</u> [a]

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Neuromuscular control patterns in Parkinson's disease: comparison of different EMG-driven neuromusculoskeletal modelling approaches

<u>M. Dalle Vacche</u> [a], G. Rigoni [a], F. Spolaor [a], D. Volpe [b], Z. Sawacha [a]

[a] University of Padova, Padova, Italy; [b] Fresco Parkinson Center, Villa Margherita, S. Stefano, Vicenza, Italy

One step towards gait-based Parkinson's disease classification

E. Troisi Lopez [a], R. Minino [b], A. Romano [b], M.C. Corsi [c], P. Sorrentino [d], G. Sorrentino [b]

[a] *Institute of Applied Sciences and Intelligent Systems, National Research Council, Pozzuoli, Italy;* [b] *Department of Medical, Motor and Wellness Sciences, University of Naples "Parthenope", Naples, Italy;* [c] *Sorbonne Université, Institut du Cerveau – Paris Brain Institute -ICM, CNRS, Inria, Inserm, AP-HP, Hopital de la Pitié Salpêtrière, F-75013, Paris, France;* [d] *Institut de Neurosciences des Systèmes, Aix-Marseille Université, 13005 Marseille, France*

A novel image processing pipeline to enhance muscle fascicle tracking during gait

E. Cesti [a,b], M. Boccardo [a,b], M. Carbonaro [a,b], G.L. Cerone [a,b], S. Seoni [b,c], K.M. Meiburger [b,c], A. Botter [a,b]

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A novel statistical approach for upper-limb movement segmentation using a single wrist-worn magneto-inertial measurement unit

G. Dotti [a], M. Ghislieri [a], M. Knaflitz [a]

[a] *Politecnico di Torino, Turin, 10129, Italy*

A markerless platform for automatic assessment of gait

R. Di Marco [a], M. Boldo [b], S. Aldegheri [a], E. Martini [b], M. Cosma [c], A. Baricich [d], G. Gasperini [e], A. Picelli [f], N. Smania [f], N. Bombieri [a]

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Upper limb joint kinematics resulting from a model conceived for the analysis of SHAP motor tasks performed by trans-radial amputees: discrepancies with the Vicon upper limb model joint kinematics

E. Zimei [a], E. Braccili [a], D. Anastasi [a], U. Della Croce [a], L. Rum [a]

[a] *University of Sassari, Sassari, Italy*

18.30   **Assemblea soci SIAMOC**

19.15   Conclusione della giornata

08.00   Registrazione Congresso

08.45   **Saluti e apertura del Presidente del Congresso**

09.00   **PRESENTAZIONI ORALI 7**
Motor Development and Pediatric Disorders
Chairs: Ilaria Carpinella, Marco Invernizzi

Quantitative analysis of motor performance in patients with Mowat Wilson Syndrome using inertial sensors
M.C. Bisi [a], F. Sperandeo [b], A. Fetta [b], L. Bergonzini [b], A. Utili [c], L. Soliani [b], V. Di Pisa [b], D.M. Cordelli [b], R. Stagni [a]
[a] Dipartimento di Ingegneria dell'Energia Elettrica e dell'Informazione "Guglielmo Marconi" – DEI, Università di Bologna, Bologna, Italy; [b] Dipartimento di Scienze Mediche e Chirurgiche, Alma Mater Studiorum, Università di Bologna, Bologna, Italy; [c] IRCCS Istituto delle Scienze Neurologiche di Bologna, U.O.C. Neuropsichiatria dell'età Pediatrica, Bologna, Italy

Does muscle fiber recruitment strategy in children with Fragile x syndrome differs from typically developing children during gait?
F. Spolaor [a], F. Beghetti [b], W.J. Piatkowska [b], R. Polli [a], V. Liani [a], V.A. Marino [b], A. Murgia [a], Z. Sawacha [b]
[a] Department of Women's and Children's Health, University of Padua, Padua, Italy; [b] Department of Information Engineering, University of Padua, Padua, Italy

Protocol for upper limb motion analysis in children with cerebral palsy: a proposal for clinical practice
C. Borghi [a], J. Verzelloni [b], D. Pandarese [a], S. Faccioli [a], S. Sassi [a]
[a] Children Rehabilitation Unit of Santa Maria Nuova Hospital, Azienda USL-IRCCS di Reggio Emilia, Reggio Emilia, Italy; [b] Child and Adolescent Neuropsychiatry Service (NPIA), Azienda USL di Modena, Sassuolo, Italy

Automated video-based General Movements analysis: sensitivity analysis of metrics in a population of very preterm infants
A. Tomadin [a], M.C. Bisi [a], A. Aceti [b], A. Sansavini [c], R. Stagni [a]
[a] DEI-Unibo, Bologna, Italy; [b] DIMEC-Unibo, Bologna, Italy; [c] PSI-Unibo, Bologna, Italy

Open-loop and closed-loop control of upright stance in adolescents with idiopathic scoliosis
M. Paramento [a,b], M. Rubega [a], E. Formaggio [a], E. Passarotto [a], P. Contessa [c], M.C. Maccarone [a,d], R. Fontana [c], H. Veronese [c], A.C. Panara [e], M. Mirando [f], C. Eyzautier [f], L. Pedrotti [f, g], A. Nardone [e, f], S. Masiero [a,c,d]
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Gait development in very-preterm toddlers: does locomotor trajectory differ from full-term pears' one?

M.C. Bisi [a], **A. Aceti** [b], **A. Tomadin** [a], **E. Benvenuti** [b], **V. Graziosi** [c], **A. Sansavini** [c], **L.T. Corvaglia** [b], **R. Stagni** [a]

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10.15   LEZIONE MAGISTRALE 5
Chair: Antonio Nardone

Walking along non-linear paths: prevention of falls and targeted rehabilitation procedures

Prof. Marco Schieppati
Senior Professor of Human Physiology and Neurophysiology at the Universities of Milan, Genoa and Pavia, Italy

Discussione

11.15   Coffee break

11.30   PRESENTAZIONI ORALI 8
Frontiers in Gait Analysis
Chair: Beatrice De Maria, Mariano Serrao

The influence of executive functions on gait kinematics during dual task walking evaluated by EEG and 3D Motion analysis
A. Fullin [a], **L. Gargiulo** [b], **F. Mancino** [b], **C.I. De Girolamo** [a], **E. Vallefuoco** [c], **N. Moccaldi** [b], **P. Arpaia** [b], **P. De Blasiis** [d]

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Does cortical activation pattern during treadmill walking change with a head stabilization task? An observational cross-sectional study in healthy subjects
A. Torchio [a], **F.G. Mestanza Mattos** [b], **J. Pollet** [a], **E. Gervasoni** [a], **C. Iester** [c], **L. Bonzano** [c], **M. Bove** [c], **D. Cattaneo** [a, b]

[a] *IRCCS Fondazione Don Carlo Gnocchi;* [b] *Università degli Studi di Milano;* [c] *Università di Genova*

The effect of subtalar arthrodesis for the correction of adult acquired flat foot deformity on in-shoe plantar pressure

P. Caravaggi [a], G. Rogati [a], C. Proietti De Marchis [a], A. Leardini [a], R, Bevoni [b], M. Girolami [b], M. Ortolani [a], L. Berti [c]

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Using textile sensors to assess electromyographic activation patterns during gait

F. Colelli Riano [a], F. Amitrano [a], A. De Rosa [a], G. Iaselli [a], A. Biancardi [a], A. Coccia [a], G. D'Addio [a]

[a] Istituti Clinici Scientifici Maugeri IRCCS, Bioengineering Unit of Telese Terme Institute, Italy

Dual-task disrupts gait smoothness in Parkinson's disease: a Timed Up and Go test study.

A. Caronni [a,b], M. Amadei [a], L. Diana [c], G. Sangalli [c], S. Scarano [a,b], V. Rota [a], N. Bolognini [c,d]

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12.30   **Consegna premi e cerimonia di chiusura**

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