

2020 8th IEEE RAS/EMBS International Conference for Biomedical Robotics and Biomechatronics (BioRob)

Nov 29 - Dec 1, 2020, New York City, NY, USA

[Program at a Glance](#) [Sunday](#) [Monday](#) [Tuesday](#) [Author Index](#) [Keyword Index](#)

Last updated on December 6, 2020. This conference program is tentative and subject to change

Technical Program for Monday November 30, 2020

To show or hide the keywords and abstract (text summary) of a paper (if available), click on the paper title

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MoLS

Room T4

Logistics and Conference Announcements Monday

Regular Session

Chair: [Agrawal, Sunil](#)

Columbia University

Co-Chair: [Krebs, Hermano Igo](#)

MIT

MoK1N

Room T5

Keynote II

Keynote Session

Chair: [Roche, Ellen](#)

MIT

Co-Chair: [Zanotto, Damiano](#)

Stevens Institute of Technology

MoAT1

Zoom link

MoAT1 Exoskeletons and Prostheses

Regular Session

Chair: [Hennig, Robert](#)

ETH Zurich

Co-Chair: [Katsura, Seiichiro](#)

Keio University

10:00-10:15, Paper MoAT1.1

[Effect of Pulse-Width Modulation Resolution on Angle Control of Wrist Joint Using Functional Electrical Stimulation](#)

[Takada, Akari](#)

Keio University

[Hirata, Akira](#)

Keio University

[Katsura, Seiichiro](#)

Keio University

10:15-10:30, Paper MoAT1.2

[Development and Evaluation of a Sensor Glove to Detect Grasp Intention for a Wearable Robotic Hand Exoskeleton](#)

[Hennig, Robert](#)

ETH Zurich

[Jessica, Gantenbein](#)

ETH Zurich

[Dittli, Jan](#)

ETH Zürich

[Chen, Haotian](#)

Nankai University

[Lacour, Stéphanie P.](#)

EPFL

[Lambercy, Olivier](#)

ETH Zurich

[Gassert, Roger](#)

ETH Zurich

MoAT2

Room T2

[MoAT2 Technology Assessment in Human Subjects/outcomes - Biomechanics](#)

Regular Session

Chair: [Agrawal, Sunil](#)

Columbia University

Co-Chair: [Iwata, Hiroyasu](#)

Waseda University

10:00-10:15, Paper MoAT2.1

[Evaluation of the Effect of High-Dorsiflexion Assistive Robotic Technology on Voluntary Ankle Movement](#)[Hong, Jing-Chen](#)

Waseda University

[Cheng, Hao](#)

Waseda University

[Hayashi, Yuki](#)

Waseda University

[Yasuda, Kazuhiro](#)

Waseda University

[Ohashi, Hiroki](#)Jikei University School
of Medicine[Iwata, Hiroyasu](#)

Waseda University

10:15-10:30, Paper MoAT2.2

[Characterization of Shoulder Load for Backpack Shoulder Strap Design Based on the Relationship between Interface Pressure and Shoulder Pain](#)[Wako, Nenta](#)

Waseda University

[Miyake, Tamon](#)

Waseda University

[Sugano, Shigeki](#)

Waseda University

MoAT3

Room T3

[MoAT3 Soft Robotics](#)

Regular Session

Chair: [Roche, Ellen](#)

MIT

Co-Chair: [Stirling, Leia](#)

University of Michigan

10:00-10:15, Paper MoAT3.1

[A Pneumatically Driven, Disposable, Soft Robotic Gripper Equipped with Retractable, Telescopic Fingers](#)[Gerez, Lucas](#)

The University of Auckland

[Liarokapis, Minas](#)

The University of Auckland

10:15-10:30, Paper MoAT3.2

[A Wearable Ankle Exercise Device for Deep Vein Thrombosis Prevention Using Thin McKibben Muscles](#)[Chang, Te-Hsin](#)

Tokyo Institute of Technology

[Koizumi, Shoichiro](#)

Tokyo Institute of Technology

[Nabae, Hiroyuki](#)

Tokyo Institute of Technology

[Endo, Gen](#)

Tokyo Institute of Technology

[Suzumori, Koichi](#)

Tokyo Institute of Technology

[Hatakeyama, Kazutoshi](#)

Akita University

[Chida, Satoaki](#)

Akita University Hospital

[Shimada, Yoichi](#)

Akita University Graduate School of Medicine

MoBT1

Room T1

MoBT1 Exoskeletons and Prosthesis - Control

Regular Session

Chair: [McPhee, John J.](#)

University of Waterloo

Co-Chair: [Katsura, Seiichiro](#)

Keio University

10:30-10:45, Paper MoBT1.1

[*A Preliminary Study on the Feasibility of Using a Knee Exoskeleton to Reduce Crouch Gait in an Adult with Cerebral Palsy*](#)[Johnson, Beau](#)

Vanderbilt University

[Goldfarb, Michael](#)

Vanderbilt University

10:45-11:00, Paper MoBT1.2

[*Assessing Control of Fixed-Support Balance Recovery in Wearable Lower-Limb Exoskeletons Using Multibody Dynamic Modelling*](#)[Inkol, Keaton A.](#)

University of Waterloo

[McPhee, John J.](#)

University of Waterloo

MoBT2

Room T2

MoBT2 Activity Recognition and Health Monitoring

Regular Session

Chair: [Agrawal, Sunil](#)

Columbia University

Co-Chair: [Iwata, Hiroyasu](#)

Waseda University

10:30-10:45, Paper MoBT2.1

[*Dynamic Motion Tracking Based on Point Cloud Matching with Personalized Body Segmentation*](#)[Ono, Tomoko](#)

Keio University

[Eguchi, Ryo](#)

Keio University

[Takahashi, Masaki](#)

Keio University

10:45-11:00, Paper MoBT2.2

[*Identification of Freezing of Gait in Parkinson's Patients Using Instrumented Shoes and Artificial Neural Networks*](#)[Prado, Antonio](#)

Columbia University

[Kwei, Kimberly](#)

Columbia University

[Vanegas-Arroyave, Nora](#)

Columbia University

[Agrawal, Sunil](#)

Columbia University

MoBT3

Room T3

MoBT3 Novel Mechanisms, Actuation and Sensing

Regular Session

Chair: [Roche, Ellen](#)

MIT

Co-Chair: [Stirling, Leia](#)

University of Michigan

10:30-10:45, Paper MoBT3.1

[*Design and Fabrication of a Biomimetic Circulatory Simulator with Overlaid Flow and Respiration Mechanism for Single Ventricle Physiology*](#)[Horvath, Markus](#)

Massachusetts Institute of Technology

[Van Story, David](#)

ETH Zurich

[Hochstein, Jon](#)

National Institutes of Health

[Pozo Alvarez, Alberto](#)

Universidad De Valladolid

[Meboldt, Mirko](#)

ETH Zurich

[Schmid Daners, Marianne](#)

ETH Zurich

[Roche, Ellen](#)

MIT

10:45-11:00, Paper MoBT3.2

[*Ankle Torque Estimation During Locomotion from Surface Electromyography and Accelerometry*](#)[Siu, Ho Chit](#)

Massachusetts Institute of Technology

[Sloboda, Jennifer](#)

MIT Lincoln Laboratory

[McKindles, Ryan](#)

MIT Lincoln Laboratory

[Stirling, Leia](#)

Massachusetts Institute of Technology

MoAPO

Spatial.chat rooms

[Poster Session a Monday](#)

Poster Session

11:00-12:00, Subsession MoAPO-01, Spatial.chat rooms

[Group A1 - Exoskeletons, Prostheses, Biomechanics & Rehabilitation](#) Poster Session, 6 papers

11:00-12:00, Subsession MoAPO-02, Spatial.chat rooms

[Group A2 - Biologically Inspired Systems - Design](#) Poster Session, 5 papers

11:00-12:00, Subsession MoAPO-03, Spatial.chat rooms

[Group A3 - Activity Recognition and Health Monitoring](#) Poster Session, 6 papers

11:00-12:00, Subsession MoAPO-04, Spatial.chat rooms

[Group A4 - Pathological Assessment / Diagnosis, Surgical Robotics](#) Poster Session, 6 papers

11:00-12:00, Subsession MoAPO-05, Spatial.chat rooms

[Group A5 - Technology Assessment in Human Subjects / Outcomes](#) Poster Session, 6 papers

11:00-12:00, Subsession MoAPO-06, Spatial.chat rooms

[Group A6 - Novel Mechanisms, Sensors and Actuators](#) Poster Session, 6 papers

11:00-12:00, Subsession MoAPO-07, Spatial.chat rooms

[Group A7 - Novel Sensors, Algorithms and Machine Learning](#) Poster Session, 6 papers

11:00-12:00, Subsession MoAPO-08, Spatial.chat rooms

[Group A8 - Soft Robotics, Haptics, Human-Machine Interaction](#) Poster Session, 6 papers**MoAPO-01**

Spatial.chat rooms

[Group A1 - Exoskeletons, Prostheses, Biomechanics & Rehabilitation](#)

Poster Session

11:00-12:00, Paper MoAPO-01.1

[*Identification of COM Control Behavior of a Human in Stance As a Dynamical System*](#)[Murai, Nobuyuki](#)

Osaka University

[Sugihara, Tomomichi](#)

Preferred Networks, Inc

11:00-12:00, Paper MoAPO-01.2

[*Retractor-Type Robotic Knee Prosthesis to Prevent Fall*](#)

Katsumura, Motoyu	Mie University
Obayashi, Shuya	Mie University
Yano, Ken'ichi	Mie University
Hamada, Atsushi	Imasen
Nakao, Tomoyuki	Mie University
Torii, Katsuhiko	Imasen

11:00-12:00, Paper MoAPO-01.3

[*A Plug-And-Train Robotic Kit \(PLUTO\) for Hand Rehabilitation: Pilot Usability Study*](#)

Nehrujee, Aravind	IIT Madras
Andrew, Hallel	Student. CMC Vellore
Sureka, Reethajanet	Occupational Therapist, CMC Vellore
Patricia, Ann	Occupational Therapist, CMC Vellore
Selvaraj, Samuelkamaleshkumar	Christian Medical College
Prakash, Henry	Professor, Department of Physical Medicine and Rehabilitation, C
Srinivasan, Sujatha	Department of Mechanical Engineering, IIT Madras, Chennai
Balasubramanian, Sivakumar	Christian Medical College

11:00-12:00, Paper MoAPO-01.4

[*Mechanical Design of an Exoskeleton with Joint-Aligning Mechanism for Children with Cerebral Palsy*](#)

Zhang, Yang	Yncréa Hauts De France
De Groof, Sander	KU Leuven
Peyrodie, Laurent	HEI-YNCREA
Labey, Luc	KU Leuven

11:00-12:00, Paper MoAPO-01.5

[*Cable-Driven 3-DOF Wrist Rehabilitation Robot with Optimized Human-Robot Interaction Performance*](#)

Shi, Ke	Southeast University
Song, Aiguo	Southeast University
Li, Ye	Southeast University
Chen, Dapeng	Southeast University
Li, Huijun	Southeast University

11:00-12:00, Paper MoAPO-01.6

[*Design of a Multi-Functional Soft Ankle Exoskeleton for Foot-Drop Prevention, Propulsion Assistance, and Inversion/Eversion Stabilization*](#)

Xia, Haisheng	Shanghai Jiao Tong University
Kwon, Junghan	Seoul National University
Pathak, Prabhat	Seoul National University
Ahn, Jooeun	Seoul National University
Shull, Peter B.	Shanghai Jiao Tong University
Park, Yong-Lae	Seoul National University

MoAPO-02

[**Group A2 - Biologically Inspired Systems - Design**](#)

Spatial.chat rooms

Poster Session

11:00-12:00, Paper MoAPO-02.1

[Hybrid Humanoid Robotic Head Mechanism: Design, Modeling, and Experiments with Object Tracking](#)[Ding, Houzhu](#)

Ubtch North America Research and Development Center Corp

[Mokhlespour Esfahani, Mohammad Iman](#)

UBTECH Robotics

[Shen, Yang](#)

UBTECH North America Research and Development Center Corp

[Tan, Huan](#)

UBTECH

[Zhang, Chengkun](#)

University of Delaware

11:00-12:00, Paper MoAPO-02.2

[Development of a Bipedal Hopping Robot with Morphable Inertial Tail for Agile Locomotion](#)[An, Jiajun](#)

The Chinese University of Hong Kong

[Chung, Tsz Yin](#)

The Chinese University of Hong Kong

[Lo, Chun Ho, David](#)

The Chinese University of Hong Kong

[Ma, Carlos](#)

CUHK

[Chu, Xiangyu](#)

The Chinese University of Hong Kong

[Au, K. W. Samuel](#)

The Chinese University of Hong Kong

11:00-12:00, Paper MoAPO-02.3

[Development of a Soft Robotics Diaphragm to Simulate Respiratory Motion](#)[Naghbi, Hamid](#)

University of Twente

[van Dorp, Jeroen](#)

University of Twente

[Abayazid, Momen](#)

University of Twente

11:00-12:00, Paper MoAPO-02.4

[Muscle Activation Patterns Estimation During Repeated Wrist Movements from MRI and SEMG](#)[Piovanelli, Enrico](#)

The University of Tokyo

[Piovesan, Davide](#)

Gannon University

[Shirafuji, Shouhei](#)

The University of Tokyo

[Yoshimura, Natsue](#)

Tokyo Institute of Technology

[Ogata, Yousuke](#)

Tokyo Institute of Technology

[Ota, Jun](#)

The University of Tokyo

11:00-12:00, Paper MoAPO-02.5

[A Controllable Biomimetic SMA-Actuated Robotic Arm](#)[Golgouneh, Alireza](#)

University of Minnesota

[Holschuh, Brad](#)

University of Minnesota

[Dunne, Lucy E.](#)

University of Minnesota

MoAPO-03

Spatial.chat rooms

[Group A3 - Activity Recognition and Health Monitoring](#)

Poster Session

11:00-12:00, Paper MoAPO-03.1

[Identification of a Step-And-Brake Controller of a Human Based on COM-ZMP Model and Terminal Capturability Condition](#)

[Kojima, Miharu](#)

Osaka University

[Sugihara, Tomomichi](#)

Preferred Networks, Inc

11:00-12:00, Paper MoAPO-03.2

[*Evaluation of Performance and Heart Rate Variability During Intensive Usage of a BCI-Controlled Hand Exoskeleton*](#)[Badesa, Francisco Javier](#)

Universidad De Cadiz

[Díez Pomares, Jorge Antonio](#)

Universidad Miguel Hernández De Elche

[Barios Heredero, Juan Antonio](#)

Miguel Hernandez University of Elche

[Catalan, José María](#)

Miguel Hernandez University

[Garcia-Aracil, Nicolas](#)

Universidad Miguel Hernandez De Elche

11:00-12:00, Paper MoAPO-03.3

[*Sport-Induced Fatigue Detection in Gait Parameters Using Inertial Sensors and Support Vector Machines*](#)[Guaitolini, Michelangelo](#)

The Biorobotics Institute, Scuola Superiore Sant'Anna

[Truppa, Luigi](#)

Scuola Superiore Sant'Anna

[Sabatini, Angelo Maria](#)

Scuola Superiore Sant'Anna

[Mannini, Andrea](#)

Scuola Superiore Sant' Anna

[Castagna, Carlo](#)

Università Di Tor Vergata

11:00-12:00, Paper MoAPO-03.4

[*Robotic System to Motivate Spontaneous Infant Kicking for Studies in Early Detection of Cerebral Palsy: A Pilot Study*](#)[Emeli, Victor](#)

Georgia Institute of Technology

[Fry, Katelyn](#)

Georgia Institute of Technology

[Howard, Ayanna](#)

Georgia Institute of Technology

11:00-12:00, Paper MoAPO-03.5

[*Fast Identification of a Human Skeleton-Marker Model for Motion Capture System Using Stochastic Gradient Descent Method*](#)[Zou, Tianyi](#)

Osaka University

[Sugihara, Tomomichi](#)

Preferred Networks, Inc

11:00-12:00, Paper MoAPO-03.6

[*A New Motion Data Structuring for Human Activity Recognition Using Convolutional Neural Network*](#)[Alemayoh, Tsige Tadesse](#)

Ehime University

[Lee, Jae Hoon](#)

Ehime University

[Okamoto, Shingo](#)

Ehime University

MoAPO-04

Spatial.chat rooms

[Group A4 - Pathological Assessment / Diagnosis, Surgical Robotics](#)

Poster Session

11:00-12:00, Paper MoAPO-04.1

[*Simulating Tendon Shortening During Flexor Tendon Repair Surgery Using a Biomechanical Model and Robotic Testbed*](#)

Tigue, James	University of Utah
Rockwell, William Bradford	University of Utah
Foreman, Bo	University of Utah
Mascaro, Stephen	University of Utah

11:00-12:00, Paper MoAPO-04.2

[*Development of a Noninvasive Device for Detection of Degenerative Brain Disorders*](#)

Yaqub, Muhammad Atif	Pusan National University
Ghafoor, Usman	Pusan National University
Hong, Keum-Shik	Pusan National University

11:00-12:00, Paper MoAPO-04.3

[*Evaluation of Virtual Shadow's Direction in Laparoscopic Surgery*](#)

Miura, Satoshi	Waseda University
Seki, Masaki	Waseda University
Koreeda, Yuta	Waseda University
Cao, Yang	Waseda University
Kawamura, Kazuya	Chiba University
Kobayashi, Yo	Osaka University
Fujie, Masakatsu G.	Waseda University
Miyashita, Tomoyuki	Waseda University

11:00-12:00, Paper MoAPO-04.4

[*Toward On-Line Fitting of a Human Skeleton-Marker Model for Accurate Motion Tracking*](#)

Zou, Tianyi	Osaka University
Sugihara, Tomomichi	Preferred Networks, Inc

11:00-12:00, Paper MoAPO-04.5

[*Sleep Restriction Effects on a Robotic Guided Motor Task*](#)

Cardoso, Lucas	University of Sao Paulo
Umemura, Guilherme Silva	University of Sao Paulo
Pedro, Leonardo M.	Federal University of São Carlos
Forner-Cordero, Arturo	Escola Politécnica. University of Sao Paulo

11:00-12:00, Paper MoAPO-04.6

[*A Braided Skeleton Surgical Manipulator with Tunable Diameter*](#)

Shang, Zufeng	Tianjin University
Ma, Jiayao	Tianjin University
You, Zhong	University of Oxford
Wang, Shuxin	Tianjin University

MoAPO-05

[**Group A5 - Technology Assessment in Human Subjects / Outcomes**](#)

Spatial.chat rooms

Poster Session

11:00-12:00, Paper MoAPO-05.1

[Assessment of Gait Symmetry, Torque Interaction and Muscular Response Due to the Unilateral Assistance Provided by an Active Knee Orthosis in Healthy Subjects](#)

[Lora, Julio](#)

CSIC

[Moreno, Juan C.](#)

Cajal Institute, CSIC

[Rocon, Eduardo](#)

CSIC

11:00-12:00, Paper MoAPO-05.2

[Human-Robot Interaction: Kinematic and Kinetic Data Analysis Framework](#)

[Moretti, Caio Benatti](#)

University of Sao Paulo

[Delbem, Alexandre Claudio Botazzo](#)

University of Sao Paulo

[Krebs, Hermano Igo](#)

MIT

11:00-12:00, Paper MoAPO-05.3

[Characteristics of Human Behavior in Force Modulation While Performing Force Tracking Tasks](#)

[Nozaki, Takahiro](#)

Keio University

[Krebs, Hermano Igo](#)

MIT

11:00-12:00, Paper MoAPO-05.4

[A Comparison between Three Commercially Available Exoskeletons in the Automotive Industry: An Electromyographic Pilot Study](#)

[Pinho, Joao P.](#)

University of Sao Paulo

[Taira, Camila](#)

University of Sao Paulo

[Parik-Americano, Pedro](#)

Universidade De São Paulo

[de Oliveira Suplino, Lucas](#)

Universidade De São Paulo

[Pacheco Bartholomeu, Victor](#)

Universidade De São Paulo

[Hartmann, Vitor N.](#)

University of Sao Paulo

[Umemura, Guilherme Silva](#)

University of Sao Paulo

[Forner-Cordero, Arturo](#)

Escola Politécnica. University of Sao Paulo

11:00-12:00, Paper MoAPO-05.5

[Lower-Limb Strategy Assessment During a Virtual Reality Based Dual-Motor-Task](#)

[Singh, Yogesh](#)

Indian Institute of Technology
Gandhinagar

[Rodrigues, Vinayvivan](#)

University of Mumbai

[Prado, Antonio](#)

Columbia University

[Agrawal, Sunil](#)

Columbia University

[Vashista, Vineet](#)

Indian Institute of Technology
Gandhinagar

11:00-12:00, Paper MoAPO-05.6

[Electrical Stimulation to Modulate Human Ankle Impedance: Effects of Intervention on Balance Control in Quiet and Perturbed Stances](#)

[Kozasa, Kohei](#)

Osaka University

[Pham, Duc Huy Hoang](#)

Friedrich-Alexander-Universität
Erlangen-Nürnberg

[Hirai, Hiroaki](#)Graduate School of Engineering
Science, Osaka University[Hori, Kaito](#)

Osaka University

[Niwa, Hideto](#)

Osaka University

[Fujihara, Ryo](#)

Osaka University

[Matsui, Kazuhiro](#)

Osaka-Univ,

[Nishikawa, Atsushi](#)

Osaka University

[Krebs, Hermano Igo](#)

MIT

MoAPO-06

Spatial.chat rooms

Group A6 - Novel Mechanisms, Sensors and Actuators

Poster Session

11:00-12:00, Paper MoAPO-06.1

Contact-Less Manipulation of Millimeter-Scale Objects Via Ultrasonic Levitation[Nakahara, Jared](#)

University of Washington

[Yang, Boling](#)

University of Washington

[Smith, Joshua R.](#)

University of Washington

11:00-12:00, Paper MoAPO-06.2

A Novel Foot Interface versus Voice for Controlling a Robotic Endoscope Holder[Yang, Yanjun](#)

Monash University

[Udatha, Soumith](#)

Indian Institute of Technology Bombay

[Kulic, Dana](#)

Monash University

[Abdi, Elahe](#)

Monash University

11:00-12:00, Paper MoAPO-06.3

Design of Under-Actuated Serial Structures with Non-Identical Modules to Match Desired Finger Postures[Alexandre Pinto Sales de Noronha, Bernardo](#)

Nanyang Technological University

[Raghavendra Kulkarni, Suhas](#)

Nanyang Technological University

[Little, Kieran](#)

Nanyang Technological University ,

[Accoto, Dino](#)

Nanyang Technological University

11:00-12:00, Paper MoAPO-06.4

A Theoretical Framework for a Network of Elastic Elements Generating Arbitrary Torque Fields[Ryali, Partha](#)

University of Illinois at Chicago

[Carella, Tommaso](#)Politecnico Di Milano and the University of
Illinois at Chicago[McDermid, Daniel](#)Valparaiso University and the Shirley Ryan
AbilityLab[Perizes, Victoria](#)

Level Ex, Inc

[Huang, Felix](#)

Tufts University

[Patton, James](#)U. of Illinois at Chicago, Shirley Ryan
AbilityLab

11:00-12:00, Paper MoAPO-06.5

Preliminary Design of an Intention-Based sEMG-Controlled 3 DOF Upper Limb Exoskeleton for Assisted Therapy in Activities of Daily Life in Patients with Hemiparesis

[Nuñez-Quispe, Johan Joseph](#)

Universidad Nacional De Ingeniería

[Campusano Solis, Daryl Ivan](#)

National University of Engineering

[Campos, Edwin](#)

UNI

[Milián Ccopa, Leonardo Paul](#)

Universidad Nacional De Ingeniería

[Soto Layme, Axel André](#)

Universidad Nacional De Ingeniería

[Huamanchumo, Johrdan](#)

Universidad Nacional De Ingeniería

[Figueroa, Alvaro](#)

UNI

[Edward Julian, Ramirez Castañeda](#)

Universidad Nacional De Ingeniería

[Brigitte, Suvo](#)

Universidad Nacional Federico Villarreal

[Nuñez Quispe, Aaron A.](#)

National University of Engineering

11:00-12:00, Paper MoAPO-06.6

[*Capacitive Sensing-Based Continuous Gait Phase Estimation in Robotic Transtibial Prostheses*](#)[Xu, Dongfang](#)

Peking University

[Crea, Simona](#)Scuola Superiore Sant'Anna, the BioRobotics
Institute[Vitiello, Nicola](#)

Scuola Superiore Sant Anna

[Wang, Qining](#)

Peking University

MoAPO-07

Spatial.chat rooms

[**Group A7 - Novel Sensors, Algorithms and Machine Learning**](#)

Poster Session

11:00-12:00, Paper MoAPO-07.1

[*Mechatronic Implementation and Trajectory Tracking Validation of a BCI-Based Human-Wheelchair Interface*](#)[Chen, Jian-Wen](#)National Taiwan University of Science
and Technology[Wu, Chun-Ju](#)National Taiwan University of Science
and Technology[Lin, I-Tseng](#)National Taiwan University of Science
and Technology[Kuo, Yu-Cheng](#)National Taiwan University of Science
and Technology[Kuo, Chung-Hsien](#)National Taiwan University of Science
and Technology

11:00-12:00, Paper MoAPO-07.2

[*Estimating Lower Limb Kinematics Using a Lie Group Constrained EKF and a Reduced Wearable IMU Count*](#)[Sy, Luke Wicent](#)

University of New South Wales

[Lovell, Nigel](#)

University of New South Wales

[Redmond, Stephen](#)

University of New South Wales

11:00-12:00, Paper MoAPO-07.3

[*Three Dimensional Position Recognition of a Magnetic Capsule Endoscope by Using Alternative Magnetic Signal*](#)[Liu, Siliang](#)

Chonnam National University

[Kim, Jayoung](#)

Chonnam National University

[Kang, Byungjeon](#)

Chonnam National University

[Choi, Eunpyo](#)

Chonnam National University

[Hong, Ayoung](#)
[Park, Jong-oh](#)
[Kim, Chang-Sei](#)

Chonnam National University
 Chonnam National University
 Chonnam National University

11:00-12:00, Paper MoAPO-07.4

[*Contact Distance Estimation by a Soft Active Whisker Sensor Based on Morphological Computation*](#)

[Nguyen, Nhan Huu](#)
[Ngo, Trung Dung](#)
[Nguyen, Dinh](#)
[Ho, Van](#)

Japan Advanced Institute of Science
and Technology
 University of Prince Edward Island
 Japan Advanced Institute of Science
and Technology
 Japan Advanced Institute of Science
and Technology

11:00-12:00, Paper MoAPO-07.5

[*Classification of Finger Tapping Tasks Using Convolutional Neural Network Based on Augmented Data with Deep Convolutional Generative Adversarial Network*](#)

[Woo, Seong-Woo](#)
[Kang, Min-Kyoung](#)
[Hong, Keum-Shik](#)

Pusan National University
 Pusan National University
 Pusan National University

11:00-12:00, Paper MoAPO-07.6

[*Towards Scalable Soft E-Skin: Flexible Event-Based Tactile-Sensors Using Wireless Sensor Elements Embedded in Soft Elastomer*](#)

[Slepyan, Ariel](#)
[Thakor, Nitish](#)

Johns Hopkins University
 National University of Singapore

MoAPO-08

[Group A8 - Soft Robotics, Haptics, Human-Machine Interaction](#)

Spatial.chat rooms
 Poster Session

11:00-12:00, Paper MoAPO-08.1

[*Control for Gravity Compensation in Tendon-Driven Upper Limb Exosuits*](#)

[Georgarakis, Anna-Maria](#)
[Song, Jaeyong](#)
[Wolf, Peter](#)
[Riener, Robert](#)
[Xiloyannis, Michele](#)

ETH Zurich
 ETH Zürich
 ETH Zurich, Institute of Robotics and Intelligent
Systems
 ETH Zurich
 Eidgenössische Technische Hochschule (ETH)
Zürich

11:00-12:00, Paper MoAPO-08.2

[*Design and Mathematical Model for Bending Pneumatic Soft Actuators with Asymmetric Cavity*](#)

[Sun, Pihsaia](#)
[Lu, Yuwen](#)
[Mai, Jingeng](#)
[Wang, Qining](#)

Peking University
 Peking University
 Peking University
 Peking University

11:00-12:00, Paper MoAPO-08.3

[Dynamics Assessment and Minimal Model of an Orthosis-Assisted Knee Motion](#)[Mallat, Randa](#)University of Paris-Est Créteil, France and
Lebanese University,[Bonnet, Vincent](#)

University of Paris-Est Créteil

[Venture, Gentiane](#)

Tokyo University of Agriculture and Technology

[Dumas, Raphaël](#)

University of Lyon – IFSTTAR

[Khalil, Mohamad](#)Lebanese University, Doctoral School for
Sciences Andtechnology,[Mohammed, Samer](#)

University of Paris Est Créteil - (UPEC)

11:00-12:00, Paper MoAPO-08.4

[Simulation Study to Test Feasibility of a Planar Teleoperated Linkage for Qualitative Stiffness Sensing with Communication Delays](#)[Wadhwa, Samir](#)

Indian Institute of Technology Bombay

[Suthar, Prakashkumar Dayarambhai](#)

Indian Institute of Technology Bombay

[Sangwan, Vivek](#)

Indian Institute of Technology Bombay

11:00-12:00, Paper MoAPO-08.5

[Spherical Parallel Instrument for Daily Living Emulation \(SPINDLE\) to Restore Motor Function of Stroke Survivors](#)[He, Peidong](#)

University at Buffalo

[Xu, Boxin](#)

University at Buffalo

[Kang, Jiyeon](#)

University at Buffalo

11:00-12:00, Paper MoAPO-08.6

[Quasi-Static Model-Based Control of Human-Soft-Robot Interaction for Assisted Hand Motion](#)[Haghshenas-Jaryani, Mahdi](#)

New Mexico State University

MoLu_Br

Room T7

[Lunch Monday](#)

Social Event

MoCT1

Room T1

[MoCT1 Exoskeletons and Prosthesis - Control](#)

Regular Session

Chair: [Young, Aaron](#)

Georgia Tech

Co-Chair: [Beckerle, Philipp](#)

Technische Universität Dortmund

13:00-13:15, Paper MoCT1.1

[Continuous Locomotion Mode Classification Using a Robotic Hip Exoskeleton](#)[Kang, Inseung](#)

Georgia Institute of Technology

[Molinaro, Dean](#)

Georgia Institute of Technology

[Choi, Gayeon](#)

Georgia Institute of Technology

[Young, Aaron](#)

Georgia Tech

13:15-13:30, Paper MoCT1.2

[Walking after Incomplete Spinal Cord Injury: Changes in Muscle Activations Due to Training with a Robotic Powered Exoskeleton](#)

Bellitto, Amy	University of Genoa
Mandraccia, Sergio	S.C. Unità Spinale Unipolare, Santa Corona Hospital, ASL2 Savone
Leoncini, Clara	S.C. Unità Spinale Unipolare, Santa Corona Hospital, ASL2 Savone
Rossi, Laura	S.C. Unità Spinale Unipolare, Santa Corona Hospital, ASL2 Savone
Gamba, Simona	S.C. Unità Spinale Unipolare, Santa Corona Hospital, ASL2 Savone
Massone, Antonino	S.C. Unità Spinale Unipolare, Santa Corona Hospital, ASL2 Savone
Casadio, Maura	University of Genoa
De Luca, Alice	Movendo Technology

MoCT2

Room T2

MoCT2 Technology Assessment in Human Subjects/outcomes - Biomechanics

Regular Session

Chair: [Agrawal, Sunil](#)

Columbia University

Co-Chair: [Xiloyannis, Michele](#)

Eidgenössische Technische Hochschule (ETH) Zürich

13:00-13:15, Paper MoCT2.1

Increasing Exercise Intensity During Outside Walking Training with a Wearable Robot[Haufe, Florian Leander](#)

ETH Zurich

[Wolf, Peter](#)

ETH Zurich, Institute of Robotics and Intelligent Systems

[Duarte, Jaime Enrique](#)

ETH Zurich

[Riener, Robert](#)

ETH Zurich

[Xiloyannis, Michele](#)

Eidgenössische Technische Hochschule (ETH) Zürich

13:15-13:30, Paper MoCT2.2

Control Mechanisms in Standing While Simultaneously Receiving Perturbations and Active Assistance from the Robotic Upright Stand Trainer (RobUST)[Luna, Tatiana](#)

Columbia University

[Santamaria, Victor](#)

Teachers College, Columbia University

[Omofuma, Isirame](#)

Columbia University

[Khan, Moiz](#)

Columbia University

[Agrawal, Sunil](#)

Columbia University

MoCT3

Room T3

MoCT3 Soft Robotics

Regular Session

Chair: [Walsh, Conor James](#)

Harvard University

Co-Chair: [Vela, Emir A.](#)

Universidad De Ingenieria Y Tecnologia - UTEC

13:00-13:15, Paper MoCT3.1

Borjibot: A Soft Robotic Device Performing Pressure and Torsional Stimuli for Neonates Oral-Motor Rehabilitation[Vela, Paulo](#)

Universidad Peruana Cayetano Heredia

[Nina Ochoa, Carlos Javier](#)[Ticllacuri, Víctor](#)[Shah, Darshi](#)[Tincopa Flores, Jean Pierre](#)[Llontop Panta, Margarita del Pilar](#)[Aguilar Aguilar, Faye](#)[Cruz Bejarano, Segundo Rogelio](#)[Vela, Emir A.](#)

Instituto Nacional De Salud Del Niño San Borja

Universidad Peruana Cayetano Heredia

Boston University

Universidad Peruana Cayetano Heredia

Instituto Nacional De Salud Del Niño - San Borja

Instituto Nacional De Salud Del Niño - San Borja

Instituto Nacional De Salud Del Niño - San Borja

Universidad De Ingenieria Y Tecnologia - UTEC

13:15-13:30, Paper MoCT3.2

[*Intention-Detection Strategies for Upper Limb Exosuits: Model-Based Myoelectric vs Dynamic-Based Control*](#)[Lotti, Nicola](#)

Heidelberg University

[Xiloyannis, Michele](#)

Eidgenössische Technische Hochschule (ETH) Zürich

[Missiroli, Francesco](#)

Heidelberg University

[Chiaradia, Domenico](#)

Scuola Superiore Sant'Anna, TeCIP Institute, PERCRO Laboratory,

[Frisoli, Antonio](#)

TeCIP Institute, Scuola Superiore Sant'Anna

[Sanguineti, Vittorio](#)

University of Genoa

[Masia, Lorenzo](#)

Heidelberg University

MoBPO

Room A1 - A8

[Poster Session B Monday](#)

Poster Session

13:30-14:20, Subsession MoBPO-01, Room A1 - A8

[Group B1 - Exoskeletons and Prostheses - Upper Body](#) Poster Session, 6 papers

13:30-14:20, Subsession MoBPO-02, Room A1 - A8

[Group B2 - Prosthetics](#) Poster Session, 5 papers

13:30-14:20, Subsession MoBPO-03, Room A1 - A8

[Group B3 - Technology Assessment in Humans & Biological Signal Processing](#) Poster Session, 5 papers

13:30-14:20, Subsession MoBPO-04, Room A1 - A8

[Group B4 - Biological Signal Processing & Identification](#) Poster Session, 5 papers

13:30-14:20, Subsession MoBPO-05, Room A1 - A8

[Group B5 - Biologically Inspired Systems - Control](#) Poster Session, 4 papers

13:30-14:20, Subsession MoBPO-06, Room A1 - A8

[Group B6 - Wearables](#) Poster Session, 5 papers

13:30-14:20, Subsession MoBPO-07, Room A1 - A8

[Group B7 - Human-Centered Design](#) Poster Session, 5 papers

13:30-14:20, Subsession MoBPO-08, Room A1 - A8

[Group B8 - Human-Machine Interfaces](#) Poster Session, 5 papers**MoBPO-01**

Room A1 - A8

[Group B1 - Exoskeletons and Prostheses - Upper Body](#)

Poster Session

13:30-14:20, Paper MoBPO-01.1

[*EMG-Based Adaptive Trajectory Generation for an Exoskeleton Model During Hand Rehabilitation Exercises*](#)

[Arteaga, María Vanessa](#)

Pontificia Universidad Javeriana Bogota

[Castiblanco, Carolina](#)

Pontificia Universidad Javeriana Bogota

[Mondragón, Iván Fernando](#)

Pontificia Universidad Javeriana

[Colorado, Julian](#)

Pontificia Universidad Javeriana

[Alvarado-Rojas, Catalina](#)

Pontificia Universidad Javeriana Bogota

13:30-14:20, Paper MoBPO-01.2

[*Biomechanical Comparison of the Validity of Two Configurations of Simulators for Body-Powered Hand Prostheses*](#)[Matias, Amanuel](#)

Loyola Marymount University

[Bennett, Camille](#)

Loyola Marymount University

[Estelle, Stephen](#)

Loyola Marymount University

[Roper, Jenevieve L.](#)

Loyola Marymount University

[Smith, Brendan W](#)

Loyola Marymount University

13:30-14:20, Paper MoBPO-01.3

[*Effects of a Soft Robotic Glove Using a High Repetition Protocol in Chronic Stroke: A Pilot Study*](#)[Nuckols, Kristin](#)

Harvard University

[Hohimer, Cameron](#)

Harvard University

[Glover, Christina](#)

Harvard University

[Schwerz de Lucena, Diogo](#)

Harvard University / Wyss Institute

[Wagner, Diana](#)

Harvard University

[Moyo, Will](#)

Harvard University

[Cloutier, Alison](#)

Massachusetts General Hospital

[Lin, David](#)

Massachusetts General Hospital

[Walsh, Conor James](#)

Harvard University

13:30-14:20, Paper MoBPO-01.4

[*Frequency Response Analysis of Actively Cooled Nylon Twisted Coiled Actuators for Use in Wrist Rehabilitation Devices*](#)[Edmonds, Brandon](#)

Western University

[Trejos, Ana Luisa](#)

The University of Western Ontario

13:30-14:20, Paper MoBPO-01.5

[*Flexion-Extension Wrist Impedance Estimation Using a Novel Portable Wrist Exoskeleton: A Pilot Study*](#)[Raiano, Luigi](#)

Campus Biomedico University of Rome

[Di Pino, Giovanni](#)

Università Campus Bio-Medico Di Roma

[Formica, Domenico](#)

Università Campus Bio-Medico Di Roma

13:30-14:20, Paper MoBPO-01.6

[*Mechatronic Design & Adaptive Control of a Lower Limb Prosthesis*](#)[Mazumder, Aniket](#)

University of Groningen

[Carlioni, Raffaella](#)

University of Groningen

MoBPO-02

Room A1 - A8

[Group B2 - Prosthetics](#)

Poster Session

13:30-14:20, Paper MoBPO-02.1

[Compliant Control of a Transfemoral Prosthesis by Combining Feed-Forward and Feedback](#)[Heins, Sophie](#)

Université Catholique De Louvain

[Flynn, Louis](#)

Vrije Universiteit Brussel

[Laloyaux, Henri](#)

Université Catholique De Louvain

[Geeroms, Joost](#)

Vrije Universiteit Brussel

[Lefeber, Dirk](#)

Vrije Universiteit Brussel

[Ronsse, Renaud](#)

Université Catholique De Louvain

13:30-14:20, Paper MoBPO-02.2

[Estimation of Energy Minimizing Series Elastic Spring Stiffness for an Active Knee Prosthesis](#)[Flynn, Louis](#)

Vrije Universiteit Brussel

[Geeroms, Joost](#)

Vrije Universiteit Brussel

[Heins, Sophie](#)

Université Catholique De Louvain

[Vanderborght, Bram](#)

Vrije Universiteit Brussel

[Lefeber, Dirk](#)

Vrije Universiteit Brussel

13:30-14:20, Paper MoBPO-02.3

[Motion Planning for Active Prosthetic Knees](#)[Eslamy, Mahdy](#)

Medical University Göttingen

[Oswald, Felix](#)

Applied Rehabilitation Technology Lab - Göttingen

[Schilling, Arndt](#)

UMG Göttingen

13:30-14:20, Paper MoBPO-02.4

[Performance Evaluation of Pattern Recognition Algorithms for Upper Limb Prosthetic Applications](#)[Marinelli, Andrea](#)

University of Genova, Italian Institute of Technologies

[Semprini, Marianna](#)

Istituto Italiano Di Tecnologia

[Canepa, Michele](#)

Italian Institute of Technologies

[Lombardi, Lorenzo](#)

Italian Institute of Technologies

[Stedman, Samuel](#)

Italian Institute of Technologies

[Dellacasa Bellingegni, Alberto](#)

INAIL

[Chiappalone, Michela](#)

Fondazione Istituto Italiano Di Tecnologia (IIT)

[Laffranchi, Matteo](#)

Istituto Italiano Di Tecnologia

[Grupponi, Emanuele](#)

INAIL Prosthesis Center

[De Michieli, Lorenzo](#)

Istituto Italiano Di Tecnologia

[Boccardo, Nicolò](#)

Istituto Italiano Di Tecnologia

13:30-14:20, Paper MoBPO-02.5

[A Lower Limb Prosthetic Augment for Optimal Energy Recycling, Biomimetic to Gastrocnemius and Achilles Tendon Function](#)[Rios Carbonell, Gabriel B](#)

University of Central Florida

[Dranetz, Joseph](#)

University of Central Florida

[Choi, Hwan](#)

University of Central Florida

MoBPO-03

Room A1 - A8

Group B3 - Technology Assessment in Humans & Biological Signal Processing

Poster Session

13:30-14:20, Paper MoBPO-03.1

*Methods for Measuring the Just Noticeable Difference for Variable Stimuli: Implications for Perception of Metabolic Rate with Exoskeleton Assistance*Medrano, Roberto

University of Michigan

Thomas, Gray

University of Texas at Austin

Rouse, ElliottUniversity of Michigan / (Google)
X

13:30-14:20, Paper MoBPO-03.2

*Therapy with T-FLEX Ankle-Exoskeleton for Motor Recovery: A Case Study with a Stroke Survivor*Gomez Vargas, Daniel AlejandroColombian School of
Engineering Julio GaravitoPinto Bernal, Maria JoseColombian School of
Engineering Julio Garavito,
Department of BiBallen-Moreno, FelipeColombian School of
Engineering Julio Garavito,
Department of BiMunera, MarcelaEscuela Colombiana De
Ingeniería Julio GaravitoCifuentes Garcia, Carlos AndresColombian School of
Engineering Julio Garavito

13:30-14:20, Paper MoBPO-03.3

*A Robot-Based Assessment of Trunk Control in Spinal Cord Injured Athletes*Marchesi, Giorgia

University of Genoa

Ricaldone, Elena

University of Genoa

De Luca, Alice

Movendo Technology

Torre, KarinS.C. Unità Spinale Unipolare,
Santa Corona Hospital, ASL2
SavoneQuinland, ElisabettaS.C. Unità Spinale Unipolare,
Santa Corona Hospital, ASL2
SavoneBellitto, Amy

University of Genoa

Squeri, Valentina

Movendo Technology

Massone, AntoninoS.C. Unità Spinale Unipolare,
Santa Corona Hospital, ASL2
SavoneCasadio, Maura

University of Genoa

Canessa, Andrea

University of Genova

13:30-14:20, Paper MoBPO-03.4

*Towards Automated Emotion Classification of Atypically and Typically Developing Infants*Lysenko, SofiyaRehabilitation Robotics Lab,
University of PennsylvaniaSeethapathi, Nidhi

University of Pennsylvania

Prosser, Laura

Children's Hospital of
Philadelphia

[Kording, Konrad](#)

University of Pennsylvania

[Johnson, Michelle J.](#)

University of Pennsylvania

13:30-14:20, Paper MoBPO-03.5

[*Velocity Modulation Assistance for Stroke Rehabilitation Based on EMG Muscular Condition*](#)

[Castiblanco, Carolina](#)

Pontificia Universidad Javeriana
Bogota

[Arteaga, María Vanessa](#)

Pontificia Universidad Javeriana
Bogota

[Mondragón, Iván Fernando](#)

Pontificia Universidad Javeriana

[Ortmann, Steffen](#)

IHP - Innovations for High
Performance Microelectronics

[Alvarado-Rojas, Catalina](#)

Pontificia Universidad Javeriana
Bogota

[Colorado, Julian](#)

Pontificia Universidad Javeriana

MoBPO-04

Room A1 - A8

[Group B4 - Biological Signal Processing & Identification](#)

Poster Session

13:30-14:20, Paper MoBPO-04.1

[*Volitional Contractility Assessment of Plantar Flexors by Using Non-Invasive Neuromuscular Measurements*](#)

[Zhang, Qiang](#)

NC State University

[Iyer, Ashwin](#)

North Carolina State University

[Kim, Kang](#)

University of Pittsburgh

[Sharma, Nitin](#)

North Carolina State University

13:30-14:20, Paper MoBPO-04.2

[*Machine Learning for Motor Learning: EEG-Based Continuous Assessment of Cognitive Engagement for Adaptive Rehabilitation Robots*](#)

[Kumar, Neelesh](#)

Rutgers University

[Michmizos, Konstantinos](#)

Rutgers University

13:30-14:20, Paper MoBPO-04.3

[*Deep Learning of Movement Intent and Reaction Time for EEG-Informed Adaptation of Rehabilitation Robots*](#)

[Kumar, Neelesh](#)

Rutgers University

[Michmizos, Konstantinos](#)

Rutgers University

13:30-14:20, Paper MoBPO-04.4

[*Analysis of Tremor During Grasp Using Ultrasound Imaging: Preliminary Results*](#)

[Iyer, Ashwin](#)

North Carolina State University

[Sheng, Zhiyu](#)

University of Pittsburgh

[Zhang, Qiang](#)

NC State University

[Kim, Kang](#)

University of Pittsburgh

[Sharma, Nitin](#)

North Carolina State University

13:30-14:20, Paper MoBPO-04.5

[Preliminary Evaluation of a Robotic Measurement System for the Assessment of Wrist Joint Spasticity](#)[Falzarano, Valeria](#)

Istituto Italiano Di Tecnologia

[Petrella, Giulia](#)

La Sapienza, University of Rome

[Marini, Francesca](#)

MathWorks

[Holmes, Michael](#)

Brock University

[Masia, Lorenzo](#)

Heidelberg University

[Morasso, Pietro Giovanni](#)

Italian Institute of Technology

[Zenzeri, Jacopo](#)

Istituto Italiano Di Tecnologia

MoBPO-05

Room A1 - A8

Group B5 - Biologically Inspired Systems - Control

Poster Session

13:30-14:20, Paper MoBPO-05.1

[Bio-Inspired Gaze-Driven Robotic Neck Brace](#)[Chang, Biing-Chwen](#)

Columbia University

[Zhang, Haohan](#)

Columbia University

[Trigili, Emilio](#)

Scuola Superiore Sant'Anna

[Agrawal, Sunil](#)

Columbia University

13:30-14:20, Paper MoBPO-05.2

[Evidence for Dynamic Primitives in a Constrained Motion Task](#)[Hermus, James](#)

Massachusetts Institute of Technology

[Sternad, Dagmar](#)

Northeastern University

[Hogan, Neville](#)

Massachusetts Institute of Technology

13:30-14:20, Paper MoBPO-05.3

[Hybrid Machine Learning-Neuromusculoskeletal Modeling for Control of Lower Limb Prosthetics](#)[Cimolato, Andrea](#)Near Lab, Medical Robotics Section, Department of
Electronics, I[Milandri, Giovanni](#)

Italian Institute of Technology

[De Mattos, Leonardo](#)

Italian Institute of Technology, Genova

[De Momi, Elena](#)

Politecnico Di Milano

[Laffranchi, Matteo](#)

Istituto Italiano Di Tecnologia

[De Michieli, Lorenzo](#)

Istituto Italiano Di Tecnologia

13:30-14:20, Paper MoBPO-05.4

[Comparison of Intramuscular and Surface Electromyography Recordings towards the Control of Wearable Robots for Incomplete Spinal Cord Injury Rehabilitation](#)[Rodrigues de Carvalho, Camila](#)Cajal Institute, Spanish National Research Council
(CSIC)[Fernández, Marvin](#)

CEU University

[Megia, Álvaro](#)Biomechanics and Assistive Technology Unit,
National Hospital Fo[Comino, Natalia](#)Biomechanics and Assistive Technology Unit,
National Hospital Fo[del-Ama, Antonio J.](#)

National Hospital for Paraplegics

[Gil-Agudo, Angel](#)[Ki Jung, Moon](#)[Muceli, Silvia](#)[Farina, Dario](#)[Moreno, Juan C.](#)[Pons, Jose Luis](#)[Barroso, Filipe](#)

Hospital Nacional De Paraplejicos

Department of Bioengineering, Imperial College
London

Chalmers University of Technology

Imperial College London

Cajal Institute, CSIC

Spanish Research Council, CSIC

Neural Rehabilitation Group, Cajal Institute, CSIC

MoBPO-06

Room A1 - A8

Group B6 - Wearables

Poster Session

13:30-14:20, Paper MoBPO-06.1

[*Wearable Sensor System for Calculating Deflection of a Running-Specific Prosthesis – a Feasibility Study*](#)[Wentink, Eva](#)

Imec Netherlands

[Plappert, Felix](#)

Imec Netherlands

13:30-14:20, Paper MoBPO-06.2

[*Oxygen Consumption in Industrial Tasks Assisted by an Active Upper-Limb Exoskeleton*](#)[Blanco, Andrea](#)

Miguel Hernandez University

[Martínez Pascual, David](#)

Miguel Hernandez University

[Catalan, José María](#)

Miguel Hernandez University

[García Pérez, José Vicente](#)

Miguel Hernandez University

[Ezquerro, Santiago](#)

Universidad Miguel Hernandez

[Díez Pomares, Jorge Antonio](#)

Universidad Miguel Hernández De Elche

[Garcia-Aracil, Nicolas](#)

Universidad Miguel Hernandez De Elche

13:30-14:20, Paper MoBPO-06.3

[*Comparative Analysis of Environment Recognition Systems for Control of Lower-Limb Exoskeletons and Prostheses*](#)[Laschowski, Brock](#)

University of Waterloo

[McNally, William](#)

University of Waterloo

[Wong, Alexander](#)

University of Waterloo

[McPhee, John J.](#)

University of Waterloo

13:30-14:20, Paper MoBPO-06.4

[*Continuous Authentication of Wearable Device Users from Heart Rate, Gait, and Breathing Data*](#)[Cheung, William](#)

Fordham University

[Vhaduri, Sudip](#)

Fordham University

13:30-14:20, Paper MoBPO-06.5

[*Challenges and Opportunities for Online Monitoring of Gait Profiles Observed from IMU Data for Fatigue Detection*](#)[Ragani Lamooki, Saeb](#)

University at Buffalo

[Kang, Jiyeon](#)

University at Buffalo

[Cavuoto, Lora](#)

University at Buffalo

[Megahed, Fadel](#)
[Jones Farmer, Allison](#)

Miami University
 Miami University

MoBPO-07

Room A1 - A8

[Group B7 - Human-Centered Design](#)

Poster Session

13:30-14:20, Paper MoBPO-07.1

[Design of a Robotic Platform for Hip Fracture Rehabilitation in Elderly People](#)

[Costa, Vanina](#)
[Ramirez, Óscar](#)
[Lora, Julio](#)
[Urendes, Eloy](#)
[Rocon, Eduardo](#)
[Perea, Luis](#)
[Raya, Rafael](#)

University San Pablo CEU
 Werium Assistive Solutions
 CSIC
 University San Pablo CEU
 CSIC
 Director Técnico (Albertia Servicios Sociosanitarios)
 CSIC

13:30-14:20, Paper MoBPO-07.2

[A Method to Evaluate and Improve the Usability of a Robotic Hand Orthosis from the Caregiver Perspective](#)

[Meyer, Jan Thomas](#)
[Dittli, Jan](#)
[Stutz, Adrian](#)
[Lambercy, Olivier](#)
[Gassert, Roger](#)

ETH Zurich
 ETH Zürich
 ETH Zürich
 ETH Zurich
 ETH Zurich

13:30-14:20, Paper MoBPO-07.3

[Feasibility Study of a Fall Prevention Cold Gas Thruster](#)

[37235-1443, 37235-1443](#)
[Baimyshev, Almaskhan](#)
[Goldfarb, Michael](#)

Vanderbilt
 Vanderbilt University
 Vanderbilt University

13:30-14:20, Paper MoBPO-07.4

[Non-Anthropomorphic Prosthesis Design Generated from Simulated Gait Optimization](#)

[Price, Mark](#)
[Sup, Frank](#)

University of Massachusetts Amherst
 University of Massachusetts - Amherst

13:30-14:20, Paper MoBPO-07.5

[An Environment Recognition and Parameterization System for Shared-Control of a Powered Lower-Limb Exoskeleton](#)

[Karacan, Kübra](#)
[Meyer, Jan Thomas](#)
[Bozma, H. Isil](#)
[Gassert, Roger](#)
[Samur, Evren](#)

Boğaziçi University
 ETH Zurich
 Bogazici University
 ETH Zurich
 Bogazici University

MoBPO-08

Room A1 - A8

Group B8 - Human-Machine Interfaces

Poster Session

13:30-14:20, Paper MoBPO-08.1

[Design and Validation of a Human-Exoskeleton Model for Evaluating Interaction Controls Applied to Rehabilitation Robotics](#)[Mosconi, Denis](#)

Federal Institute of São Paulo

[Ferreira Nunes, Polyana](#)

Universidade De São Paulo

[Ostan, Icaro](#)

University of Sao Paulo

[Siqueira, Adriano](#)

University of Sao Paulo

13:30-14:20, Paper MoBPO-08.2

[Investigating the Effects of Stimulation Duration for Brain-Computer Interface](#)[Khan, M. N. Afzal](#)

Pusan National University

[Hong, Keum-Shik](#)

Pusan National University

13:30-14:20, Paper MoBPO-08.3

[Towards End-To-End Control of a Robot Prosthetic Hand Via Reinforcement Learning](#)[Sharif, Mohammadreza](#)

Northeastern University

[Erdogmus, Deniz](#)

Northeastern University

[Amato, Christopher](#)

Northeastern University

[Padir, Taskin](#)

Northeastern University

13:30-14:20, Paper MoBPO-08.4

[Psychometric Evaluation of Multi-Point Bone-Conducted Tactile Stimulation on the Three Bony Landmarks of the Elbow](#)[Mayer, Raphael Maria](#)

University of Melbourne

[Mohammadi, Alireza](#)

The University of Melbourne

[Tan, Ying](#)

The University of Melbourne

[Alici, Gursel](#)

University of Wollongong

[Choong, Peter](#)

The University of Melbourne

[Oetomo, Denny](#)

The University of Melbourne

13:30-14:20, Paper MoBPO-08.5

[The Effects of Limb Position and External Load on Offline Myoelectric Pattern Recognition Control](#)[Teh, Yuni](#)

Northwestern University

[Hargrove, Levi](#)

Rehabilitation Institute of Chicago

MoPM1Br

Room T7

[Coffee Break 3](#)

Social Event

MoDT1

Room T1

[MoDT1 Exoskeletons and Prosthesis - Control](#)

Regular Session

Chair: [Beckerle, Philipp](#)

Technische Universität Dortmund

Co-Chair: [Young, Aaron](#)

Georgia Tech

14:30-14:45, Paper MoDT1.1

[A Stiffness-Fault-Tolerant Control Strategy for an Elastically Actuated Powered Knee Orthosis](#)[Velasco-Guillen, Rodrigo J.](#)

Technische Universität Dortmund

[Grosu, Victor](#)

Vrije Universiteit Brussel - VUB - Belgium

[Carmona-Ortiz, Victor A.](#)

UPC Barcelona

[Vanderborght, Bram](#)

Vrije Universiteit Brussel

[Lefeber, Dirk](#)

Vrije Universiteit Brussel

[Font-Llagunes, Josep Maria](#)

Universitat Politècnica De Catalunya

[Beckerle, Philipp](#)

Technische Universität Dortmund

14:45-15:00, Paper MoDT1.2

[Predicting Individualized Joint Kinematics Over a Continuous Range of Slopes and Speeds](#)[Reznick, Emma](#)

University of Texas at Dallas

[Embry, Kyle](#)

University of Texas at Dallas

[Gregg, Robert D.](#)

University of Michigan

MoDT2

Room T2

[MoDT2 Activity Recognition/Health Monitoring/Technology Assessment in Human Subjects](#)

Regular Session

Chair: [Agrawal, Sunil](#)

Columbia University

Co-Chair: [Xiloyannis, Michele](#)

Eidgenössische Technische Hochschule (ETH) Zürich

14:30-14:45, Paper MoDT2.1

[Cerebrovascular Event Detection Robotic System: Rob Bitt](#)[Sidulova, Mariia](#)

The George Washington University

[Kim, Ria](#)

George Washington University

[Park, Chung Hyuk](#)

George Washington University

14:45-15:00, Paper MoDT2.2

[Exoskeleton Assistance Improves Crouch During Overground Walking with Forearm Crutches: A Case Study](#)[Bulea, Thomas](#)

National Institutes of Health

[Chen, Ji](#)

National Institutes of Health

[Damiano, Diane](#)

National Institutes of Health

MoDT3

Room T3

[MoDT3 Soft Robotics](#)

Regular Session

Chair: [Walsh, Conor James](#)

Harvard University

Co-Chair: [Vela, Emir A.](#)

Universidad De Ingenieria Y Tecnologia - UTEC

14:30-14:45, Paper MoDT3.1

[Dynamic Primitives Facilitate Manipulating a Whip](#)[Nah, Moses](#)

MIT

[Krotov, Aleksei](#)

Northeastern University

[Russo, Marta](#)

Northeastern University

[Sternad, Dagmar](#)

Northeastern University

[Hogan, Neville](#)

Massachusetts Institute of Technology

14:45-15:00, Paper MoDT3.2

[A Soft Inflatable Wearable Robot for Hip Abductor Assistance: Design and Preliminary Assessment](#)[Yang, Hee Doo](#)

Harvard University

[Cooper, Myles](#)

Harvard University

[Akbas, Tunc](#)

University of Texas at Austin

[Schumm, Lexine](#)

Harvard

[Orzel, Dorothy](#)

Harvard University

[Walsh, Conor James](#)

Harvard University

MoET1

Room T1

[MoET1 Exoskeletons and Prosthesis - Lower Limb](#)

Regular Session

Chair: [Kang, Jiyeon](#)

University at Buffalo

Co-Chair: [Gregg, Robert D.](#)

University of Michigan

15:00-15:15, Paper MoET1.1

[Testing Simulated Assistance Strategies on a Hip-Knee-Ankle Exoskeleton: A Case Study](#)[Franks, Patrick W.](#)

Stanford University

[Bianco, Nicholas August](#)

Stanford University

[Bryan, Gwendolyn](#)

Stanford University

[Hicks, Jennifer](#)

Stanford University

[Delp, Scott](#)

Stanford University

[Collins, Steven H.](#)

Stanford University

15:15-15:30, Paper MoET1.2

[An Integrated, Back-Drivable Electro-Hydrostatic Actuator for a Knee Prosthesis](#)[Tessari, Federico](#)

Istituto Italiano Di Tecnologia

[Galluzzi, Renato](#)

Politecnico Di Torino

[Tonoli, Andrea](#)

Politecnico Di Torino

[Amati, Nicola](#)

Politecnico Di Torino

[Milandri, Giovanni](#)

Italian Institute of Technology

[Laffranchi, Matteo](#)

Istituto Italiano Di Tecnologia

[De Michieli, Lorenzo](#)

Istituto Italiano Di Tecnologia

MoET2

Room T2

[MoET2 Technology Assessment in Human Subjects](#)

Regular Session

Chair: [Zanotto, Damiano](#)

Stevens Institute of Technology

Co-Chair: [Goldman, Sylvie](#)

Columbia University Irving Medical Center

15:00-15:15, Paper MoET2.1

[Validation of Insole-Based Gait Analysis System in Young Children with a Neurodevelopmental Disorder and Autism Traits](#)[Duong, Ton](#)

Stevens Institute of Technology

[Goldman, Sylvie](#)

Columbia University Irving Medical Center

[Zhang, Huanghe](#)

Stevens Institute of Technology

[Salazar, Rachel](#)

Columbia University Irving Medical Center

[Beenders, Sara](#)

Drexel University

[Cornett, Kayla](#)

Columbia University Irving Medical Center

[Bain, Jennifer](#)

Columbia University Irving Medical Center

[Montes, Jacqueline](#)

Columbia University Irving Medical Center

[Zanotto, Damiano](#)

Stevens Institute of Technology

15:15-15:30, Paper MoET2.2

[*Design and Preliminary Evaluation of a Perturbation-Based Robot-Assisted Assessment of Hand Sensorimotor Impairments*](#)[Zbytniewska, Monika](#)

ETH Zurich

[Siegenthaler, Marc](#)

ETH Zurich

[Kanzler, Christoph M.](#)

Rehabilitation Engineering Laboratory, ETH Zurich

[Hermsdörfer, Joachim](#)

TU München

[Gassert, Roger](#)

ETH Zurich

[Lambercy, Olivier](#)

ETH Zurich

MoET3

Room T3

[MoET3 Algorithms and Machine Learning](#)

Regular Session

Chair: [Krebs, Hermano Igo](#)

MIT

Co-Chair: [Ronsse, Renaud](#)

Université Catholique De Louvain

15:00-15:15, Paper MoET3.1

[*Trajectory Planning of a Bio-Inspired Walker in 3D Cluttered Environments Using Internal Models*](#)[Van der Noot, Nicolas](#)

Université Catholique De Louvain; École Polytechnique Fédérale D

[Ijspeert, Auke](#)

EPFL

[Ronsse, Renaud](#)

Université Catholique De Louvain

15:15-15:30, Paper MoET3.2

[*Adaptive Gait Phase Segmentation Based on the Time-Varying Identification of the Ankle Dynamics: Technique and Simulation Results*](#)[Perez Ibarra, Juan Carlos](#)

University of São Paulo

[Siqueira, Adriano](#)

University of Sao Paulo

[Krebs, Hermano Igo](#)

MIT

MoCPO

Room T6

[Poster Session C Monday](#)

Poster Session

15:30-16:20, Subsession MoCPO-01, Room T6

[Group C1 - Exoskeletons, Prostheses, Biomechanics & Rehabilitation](#) Poster Session, 6 papers

15:30-16:20, Subsession MoCPO-02, Room T6

[Group C2 - Biomechanics and Rehabilitation - Lower Limb](#) Poster Session, 5 papers

15:30-16:20, Subsession MoCPO-03, Room T6

[Group C3 - Exoskeletons and Prostheses - Lower Limb](#) Poster Session, 5 papers

15:30-16:20, Subsession MoCPO-04, Room T6

Group C4 - Surgical Robotics & Pathological Assessment I Poster Session, 5 papers

15:30-16:20, Subsession MoCPO-05, Room T6

Group C5 - Surgical Robotics & Pathological Assessment II Poster Session, 6 papers

15:30-16:20, Subsession MoCPO-06, Room T6

Group C6 - Algorithms and Machine Learning Poster Session, 6 papers

15:30-16:20, Subsession MoCPO-07, Room T6

Group C7 - Human-Robot Interaction Poster Session, 6 papers

15:30-16:20, Subsession MoCPO-08, Room T6

Group C8 - Late Breaking Abstracts Poster Session, 5 papers**MoCPO-01**

Room T6

Group C1 - Exoskeletons, Prostheses, Biomechanics & Rehabilitation

Poster Session

15:30-16:20, Paper MoCPO-01.1

*An Investigation into the Dissipation of Vibrations Using Electromyography towards the Development of Self-Adapting Robotic Prosthesis*Magbagbeola, Morenike Abisola Daniella

University College London

Jevtic Vojinovic, Tijana

Aspire CREATE

Miodownik, Mark

University College London

Hailes, StephenUniversity College London , Dept. of
Computer Science , Gower SLoureiro, Rui C. V.

University College London

15:30-16:20, Paper MoCPO-01.2

*Effect of Movement Type on the Classification of Electromyography Data for the Control of Dexterous Prosthetic Hands*Atzori, ManfredoUniversity of Applied Sciences Western
Switzerland (HES-SO ValaiRosanda, ElisaUnità Operativa Complessa Di Chirurgia
Della Mano, Università DePajardi, GiorgioUnità Operativa Complessa Di Chirurgia
Della Mano, Università DeBassetto, Franco

University Hospital of Padova

Müller, HenningUniversity of Applied Sciences Western
Switzerland (HES-SO Valai

15:30-16:20, Paper MoCPO-01.3

*An Upper Limb Mirror Therapy Environment with Hand Tracking in Virtual Reality*Mazzola, Steven

Columbia University

Prado, Antonio

Columbia University

Agrawal, Sunil

Columbia University

15:30-16:20, Paper MoCPO-01.4

*Development and Pilot Evaluation of the ArmTracker: A Wearable System to Monitor Arm Kinematics During Daily Life*Carmona-Ortiz, Victor A.

UPC Barcelona

[Lobo-Prat, Joan](#)Institut De Robòtica I Informàtica
Industrial, CSIC-UPC[Van Ruysevelt, Jeremy](#)Institut De Robòtica I Informàtica
Industrial, CSIC-UPC[Torras, Carme](#)

Csic - Upc

[Font-Llagunes, Josep Maria](#)

Universitat Politècnica De Catalunya

15:30-16:20, Paper MoCPO-01.5

[*Trajectory Control for 3 Degree-Of-Freedom Wrist Prosthesis in Virtual Reality: A Pilot Study*](#)[Gloumakov, Yuri](#)

Yale University

[Bimbo, Joao](#)

Yale University

[Dollar, Aaron](#)

Yale University

15:30-16:20, Paper MoCPO-01.6

[*Passive Exotendon Spring Elements Can Replace Muscle Torque During Gait*](#)[Malizia, Beatrice](#)

University of Illinois at Chicago

[Ryali, Partha](#)

University of Illinois at Chicago

[Patton, James](#)U. of Illinois at Chicago, Shirley Ryan
AbilityLab**MoCPO-02**

Room T6

[Group C2 - Biomechanics and Rehabilitation - Lower Limb](#)

Poster Session

15:30-16:20, Paper MoCPO-02.1

[*Simulating the Response of a Neuro-Musculoskeletal Model to Assistive Forces: Implications for the Design of Wearables Compensating for Motor Control Deficits*](#)[Stollenmaier, Katrin](#)

University of Tuebingen

[Rist, Ilka Stefanie](#)Hertie Institute for Clinical Brain Research,
University of Tübi[Izzi, Fabio](#)

MPI IS Stuttgart

[Haeufle, Daniel Florian Benedict](#)

University of Tübingen, Germany

15:30-16:20, Paper MoCPO-02.2

[*Reinforcement Learning Assist-As-Needed Control for Robot Assisted Gait Training*](#)[Zhang, Yufeng](#)

Stevens Institute of Technology

[Li, Shuai](#)

Stevens Institute of Technology

[Nolan J., Karen](#)

Kessler Foundation

[Zanotto, Damiano](#)

Stevens Institute of Technology

15:30-16:20, Paper MoCPO-02.3

[*Biological Hip Torque Estimation Using a Robotic Hip Exoskeleton*](#)[Molinaro, Dean](#)

Georgia Institute of Technology

[Kang, Inseung](#)

Georgia Institute of Technology

[Camargo, Jonathan](#)

Universidad De Los Andes

[Young, Aaron](#)

Georgia Tech

15:30-16:20, Paper MoCPO-02.4

[Biomechanical Effects of a Passive Hip Structure in a Knee Exoskeleton for People with Spinal Cord Injury: A Comparative Case Study](#)

[de Miguel-Fernandez, Jesus](#)

Polytechnic University of Catalonia

[Rodriguez-Fernandez, Antonio](#)

Polytechnic University of Catalonia

[Morey-Olive, Pau](#)

ABLE Human Motion

[Lobo-Prat, Joan](#)

Institut De Robòtica I Informàtica Industrial,
CSIC-UPC

[Font-Llagunes, Josep Maria](#)

Universitat Politècnica De Catalunya

15:30-16:20, Paper MoCPO-02.5

[Normalized Criteria and Comparative Analysis of Legged Stability](#)

[Peng, William](#)

New York University

[Kim, Joo H.](#)

New York University

MoCPO-03

Room T6

[Group C3 - Exoskeletons and Prostheses - Lower Limb](#)

Poster Session

15:30-16:20, Paper MoCPO-03.1

[Lower-Limb Amputees Can Reduce the Energy Cost of Walking When Assisted by an Active Pelvis Orthosis](#)

[Martini, Elena](#)

Scuola Superiore Sant'Anna of Pisa

[Sanz-Morère, Clara Beatriz](#)

Scuola Superiore Sant'Anna

[Livolsi, Chiara](#)

IUVO S.r.l, Scuola Superiore Sant'Anna of Pisa

[Pergolini, Andrea](#)

Scuola Superiore Sant'Anna of Pisa

[Arnetoli, Gabriele](#)

IRCCS Fondazione Don Carlo Gnocchi

[Doronzio, Stefano](#)

IRCCS Fondazione Don Carlo Gnocchi

[Giffone, Antonella](#)

IRCCS Fondazione Don Carlo Gnocchi

[Conti, Roberto](#)

University of Florence

[Giovacchini, Francesco](#)

Scuola Superiore Sant'Anna

[Friðriksson, Þór](#)

Össur

[Lechler, Knut](#)

Össur

[Crea, Simona](#)

Scuola Superiore Sant'Anna, the BioRobotics Institute

[Vitiello, Nicola](#)

Scuola Superiore Sant Anna

15:30-16:20, Paper MoCPO-03.2

[Quantifying Kinematic Adaptations of Gait During Walking on Terrains of Varying Surface Compliance](#)

[Lehmann, Lynsey](#)

Arizona State University

[Artemiadis, Panagiotis](#)

University of Delaware

15:30-16:20, Paper MoCPO-03.3

[Myoelectric Model-Based Control of a Bi-Lateral Robotic Ankle Exoskeleton During Even Ground Locomotion](#)

[Durandau, Guillaume](#)

University of Twente

[Rampeltshammer, Wolfgang Franz](#)

University Twente

[Kooij, H van der](#)

University of Twente

[Sartori, Massimo](#)

University of Twente

15:30-16:20, Paper MoCPO-03.4

[Preliminary Investigation of Predicting Time-To-Next Heelstrike Using Accelerometers and Machine Learning](#)[Bauman, Valerie](#)

University of Guelph

[Brandon, Scott](#)

University of Guelph

15:30-16:20, Paper MoCPO-03.5

[User Preference of Applied Torque Characteristics for Bilateral Powered Ankle Exoskeletons](#)[Ingraham, Kimberly](#)

University of Michigan

[Remy, C. David](#)

University of Stuttgart

[Rouse, Elliott](#)

University of Michigan / (Google) X

MoCPO-04

Room T6

[Group C4 - Surgical Robotics & Pathological Assessment I](#)

Poster Session

15:30-16:20, Paper MoCPO-04.1

[RNN-LSTM Based Tissue Classification in Robotic System for Breast Biopsy](#)[Sankaran, Naveen Kumar](#)

University of Illinois at Urbana-Champaign

[Kesavadas, Thenkurussi](#)

University of Illinois at Urbana-Champaign

15:30-16:20, Paper MoCPO-04.2

[A Comparison between Reaching Distance and Work Area for Measuring the Impact of Flexion Synergy on Reaching Function in Chronic Moderate to Severe Hemiparetic Stroke](#)[Ellis, Michael](#)

Northwestern University

[Admani, Sabeen](#)

Northwestern University

15:30-16:20, Paper MoCPO-04.3

[Assessment of a Commercial Virtual Reality Controller for Telemanipulation of an Articulated Robotic Arm](#)[Schäfer, Max Bert](#)

University of Stuttgart

[Stewart, Kent](#)University of Stuttgart, Institute of Medical
Device Technology[Löscher, Nico](#)University of Stuttgart, Institute of Medical
Device Technology[Pott, Peter](#)

Universität Stuttgart

15:30-16:20, Paper MoCPO-04.4

[Eccentric-Tube Robot \(ETR\) Modeling and Validation](#)[Wang, Lexuan](#)

Western University

[Pedrosa, Filipe](#)

Western University

[Patel, Rajnikant V.](#)

The University of Western Ontario

15:30-16:20, Paper MoCPO-04.5

[Brainstem BOLD Response to Visual and Acoustic Stimuli in People with Post-Stroke Spasticity](#)[Han, Chungmin](#)

University of Texas at Austin

[Ress, David](#)

Baylor College of Medicine

[Ramos Nuñez, Aurora I.](#)

College of Coastal Georgia

[de la Rosa, Natasha](#)

University of Massachusetts Amherst

[Li, Sheng](#)University of Texas Health Science Center
at Houston[Sulzer, James](#)

University of Texas at Austin

MoCPO-05

Room T6

Group C5 - Surgical Robotics & Pathological Assessment II

Poster Session

15:30-16:20, Paper MoCPO-05.1

[*Toward Synergic Learning for Autonomous Manipulation of Deformable Tissues Via Surgical Robots: An Approximate Q-Learning Approach*](#)[Aghajani Pedram, Sahba](#)

University of California, Los Angeles

[Ferguson, Peter](#)

University of California Los Angeles

[Shin, Changyeob](#)

University of California, Los Angeles

[Mehta, Ankur](#)

UCLA

[Dutson, Erik](#)

UCLA

[Alambeigi, Farshid](#)

University of Texas at Austin

[Rosen, Jacob](#)

University of California, Los Angeles

15:30-16:20, Paper MoCPO-05.2

[*Design of a Novel Surgical Robot with Rigidity-Adjustable Joints Based on Time-Division Multiplexing Actuation*](#)[Zuo, Yashuai](#)

University of Alabama

[Merritt, Glen](#)

The University of Alabama

[Wang, Xuefeng](#)

University of Alabama

15:30-16:20, Paper MoCPO-05.3

[*A New 7-Degree-Of-Freedom Parallel Robot with Remote Center-Of-Motion for Eye Surgery*](#)[Jian, Yinglun](#)

Queen's University Belfast

[Jin, Yan](#)

Queen's University of Belfast, UK

[Price, Mark Anthony](#)

Queens University Belfast

[Moore, Johnny](#)

Cathedral Eye Clinic

15:30-16:20, Paper MoCPO-05.4

[*Development of an Interactive Anatomical Model for Robotic TAPP Inguinal Hernia Repair Surgical Training*](#)[Zhu, Qinyi](#)

University of Pennsylvania

[Sigmon, David](#)

University of Pennsylvania

[Soriano, Ian S.](#)

University of Pennsylvania

[Dumon, Kristoffel R.](#)

University of Pennsylvania

[Johnson, Michelle J.](#)

University of Pennsylvania

15:30-16:20, Paper MoCPO-05.5

[*Needle Tip Manipulation and Control of a 3D Steerable SMA-Activated Flexible Needle*](#)[Konh, Bardia](#)

University of Hawaii at Manoa

[Berkelman, Peter](#)

University of Hawaii-Manoa

[Karimi, Saeed](#)

University of Hawaii at Manoa

15:30-16:20, Paper MoCPO-05.6

[*Objective Robot-Based Measures of Cognitive and Motor Function in Stroke and HIV*](#)

[Bui, Kevin](#)

University of Pennsylvania

[Johnson, Michelle J.](#)

University of Pennsylvania

MoCPO-06

Room T6

[Group C6 - Algorithms and Machine Learning](#)

Poster Session

15:30-16:20, Paper MoCPO-06.1

[*Human Activity Recognition Using Recurrent Neural Network Classifiers on Raw Signals from Insole Piezoresistors*](#)

[Paydarfar, Arman](#)

Columbia University

[Prado, Antonio](#)

Columbia University

[Agrawal, Sunil](#)

Columbia University

15:30-16:20, Paper MoCPO-06.2

[*Texture Detection by Hardware-Friendly Low-Level Preprocessing*](#)

[Lora Rivera, Raul](#)

Universidad De Málaga

[de Guzmán-Manzano, Arturo](#)

Universidad De Málaga

[Luna-Cortés, José Antonio](#)

Universidad De Málaga

[Oballe-Peinado, Óscar](#)

University of Málaga

[Vidal-Verdú, Fernando](#)

Universidad De Málaga

15:30-16:20, Paper MoCPO-06.3

[*Measurement of Sensory Information for Day-To-Day Autism Management*](#)

[Vicente-Samper, Jose Maria](#)

Miguel Hernandez University of Elche

[Avila, Ernesto](#)

Miguel Hernandez University of Elche

[Sabater-Navarro, Jose M.](#)

Univ. Miguel Hernandez De Elche

15:30-16:20, Paper MoCPO-06.4

[*LIDAR Based Walking Speed Estimation: A Portable Alternative to Optical Motion Capture System*](#)

[Haider, Masudul](#)

University of Alabama

[Haque, Md Rejwanul](#)

The University of Alabama

[Sazonov, Edward](#)

University of Alabama

[Shen, Xiangrong](#)

The University of Alabama

15:30-16:20, Paper MoCPO-06.5

[*Coordinated Movement for Prosthesis Reference Trajectory Generation: Temporal Factors and Attention*](#)

[Rai, Vijeth](#)

University of Washington

[Sharma, Abhishek](#)

University of Washington, Seattle

[Preechayasomboon, Pornthep](#)

University of Washington

[Rombokas, Eric](#)

University of Washington

15:30-16:20, Paper MoCPO-06.6

[*Modular Deep Reinforcement Learning for Emergent Locomotion on a Six-Legged Robot*](#)

[Schilling, Malte](#)[Konen, Kai](#)[Korthals, Timo](#)

Bielefeld University

Neuroinformatics Group, Bielefeld University

Bielefeld University

MoCPO-07

Room T6

Group C7 - Human-Robot Interaction

Poster Session

15:30-16:20, Paper MoCPO-07.1

Impact of Diverse Aspects in User-Prosthesis Interfaces for Myoelectric Upper-Limb Prostheses[Cardona, Diego](#)

Galileo University

[Maldonado Caballeros, Guillermo José](#)

Galileo University

[Ferman, Victor](#)

University of Campinas - UNICAMP

[Lemus, Ali A.](#)

Galileo University

[Fajardo, Julio](#)

Universidad Galileo

15:30-16:20, Paper MoCPO-07.2

The Force-Feedback Coupling Effect in Bilateral Tele-Impedance[Doornebosch, Luuk](#)

TU Delft

[Abbink, David A.](#)

Delft University of Technology

[Peternel, Luka](#)

Delft University of Technology

15:30-16:20, Paper MoCPO-07.3

Overground Gait Patterns Changed by Modulating Hip Stiffness with a Robotic Exoskeleton[Huber, Meghan](#)

University of Massachusetts Amherst

[Lee, Jongwoo](#)

Massachusetts Institute of Technology (MIT)

[Agarwal, Vibha](#)

MIT

[Warren, Haley](#)

University of Vermont

[Hogan, Neville](#)

Massachusetts Institute of Technology

15:30-16:20, Paper MoCPO-07.4

Enhancing Robot-Environment Physical Interaction Via Optimal Impedance Profiles[Averta, Giuseppe](#)

University of Pisa

[Hogan, Neville](#)

Massachusetts Institute of Technology

15:30-16:20, Paper MoCPO-07.5

A Soft Robotic Device for Patient Immobilization in Sitting and Reclined Positions for a Compact Proton Therapy System[Buchner, Thomas Jakob Konrad](#)

Technical University of Munich

[Yan, Susu](#)

Massachusetts General Hospital and Harvard Medical School

[Li, Shuguang](#)

MIT/Harvard University

[Flanz, Jay](#)

Massachusetts General Hospital and Harvard Medical School

[Hueso-González, Fernando](#)

Massachusetts General Hospital and Harvard Medical School

[Kielty, Edward](#)

Massachusetts General Hospital and Harvard Medical School

[Bortfeld, Thomas](#)

Massachusetts General Hospital and Harvard Medical School

[Rus, Daniela](#)

MIT

15:30-16:20, Paper MoCPO-07.6

[Feasibility of Two Different EMG-Based Pattern Recognition Control Paradigms to Control a Robot after Stroke – Case Study](#)[Kopke, Joseph](#)

Northwestern University

[Ellis, Michael](#)

Northwestern University

[Hargrove, Levi](#)

Rehabilitation Institute of Chicago

MoCPO-08

Room T6

[Group C8 - Late Breaking Abstracts](#)

Poster Session

15:30-16:20, Paper MoCPO-08.1

[An EMG Leg for Amputee Bikers with Gear Control](#)[Sriranjan, Rasakatla](#)

Tokyo University of Agriculture and Technology

[Mizuuchi, Ikuo](#)

Tokyo University of Agriculture and Technology

[Indurkha, Bipin](#)

Jagiellonian University

15:30-16:20, Paper MoCPO-08.2

[An Aortic Constriction Device to Model Cardiac Disease in a Mock Circulatory Loop](#)[Rosalia, Luca](#)

Massachusetts Institute of Technology

[Ozturk, Caglar](#)

Massachusetts Institute of Technology

[Nguyen, Christopher](#)

MGH

[Roche, Ellen](#)

MIT

15:30-16:20, Paper MoCPO-08.3

[Development of the AI Therapist Estimating the Borg Scale of Stroke Patients in Robot-Assisted Gait Training](#)[Chang, Minsu](#)

Sogang University

[Jeon, Doyoung](#)

Sogang University

15:30-16:20, Paper MoCPO-08.4

[Anticipation of Speed Transitions Using EMG](#)[Fogelson, Brian](#)

University of Michigan

[Stirling, Leia](#)

University of Michigan

[Siu, Ho Chit](#)

Massachusetts Institute of Technology

15:30-16:20, Paper MoCPO-08.5

[A Data Driven Approach for Predicting Preferred Ankle Stiffness](#)[Shetty, Varun Satyadev](#)

University of Michigan

[Lee, Ung Hee](#)

University of Michigan

[Rouse, Elliott](#)

University of Michigan / (Google) X

MoPM2Br

Room T7

[Coffee Break 4](#)

Social Event

MoFT1

Room T1

MoFT1 Exoskeletons and Prosthesis - Design - Lower Limb

Regular Session

Chair: [Gregg, Robert D.](#)

University of Michigan

Co-Chair: [Kang, Jiyeon](#)

University at Buffalo

16:30-16:45, Paper MoFT1.1

[*Electric-Energetic Consequences of Springs in Lower-Extremity Powered Prostheses on Varied Terrain*](#)[Carney, Matthew](#)

Massachusetts Institute of Technology

[Herr, Hugh](#)

MIT Media Lab

16:45-17:00, Paper MoFT1.2

[*A Potential Energy Shaping Controller with Ground Reaction Force Feedback for a Multi-Activity Knee-Ankle Exoskeleton*](#)[Divekar, Nikhil](#)

University of Michigan

[Lin, Jianping](#)

University of Michigan

[Nesler, Christopher](#)

University of Michigan

[Borboa, Sara](#)

University of Texas at Dallas

[Gregg, Robert D.](#)

University of Michigan

MoFT2

Room T2

MoFT2 Pathological Assessment/Diagnosis

Regular Session

Chair: [Zanotto, Damiano](#)

Stevens Institute of Technology

Co-Chair: [Murphey, Todd](#)

Northwestern University

16:30-16:45, Paper MoFT2.1

[*Hand Exoskeleton to Assess Hand Spasticity*](#)[Erden, Mustafa Suphi](#)

Heriot-Watt University

[Mccoll, William Alexander](#)

Heriot Watt University

[Abassebay, Djouzar](#)

Heriot-Watt University

[Haldane, Shaun](#)

Heriot Watt

16:45-17:00, Paper MoFT2.2

[*Shoulder Abduction Loading Affects Motor Coordination in Individuals with Chronic Stroke, Informing Targeted Rehabilitation*](#)[Kalinowska, Aleksandra](#)

Northwestern University

[Rudy, Kyra](#)

Northwestern University

[Schlafly, Millicent](#)

University of South Florida

[Fitzsimons, Kathleen](#)

Northwestern University

[Dewald, Julius P. A.](#)

Northwestern University

[Murphey, Todd](#)

Northwestern University

MoFT3

Room T3

MoFT3 Haptics

Regular Session

Chair: [Krebs, Hermano Igo](#)

MIT

Co-Chair: [Ronsse, Renaud](#)

Université Catholique De Louvain

16:30-16:45, Paper MoFT3.1



[A Novel Proprioceptive Feedback System for Supernumerary Robotic Limb](#)

[Noccaro, Alessia](#)

[Raiano, Luigi](#)

[Pinardi, Mattia](#)

[Formica, Domenico](#)

[Di Pino, Giovanni](#)

Università Campus Bio-Medico Di Roma

Campus Biomedico University of Rome

Campus Bio-Medico University of Rome

Università Campus Bio-Medico Di Roma

Università Campus Bio-Medico Di Roma

MoK2N

Room T5

[Keynote III](#)

Keynote Session

Chair: [Rouse, Elliott](#)

University of Michigan / (Google) X

Co-Chair: [Walsh, Conor James](#)

Harvard University

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