



Exoskeletons and Wearable Robots: current practice and future perspectives

in automotive, aviation, construction, health care, logistics, manufacturing

BEC! Bilbao Exhibition Centre, Spain
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co-organised by



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www.exoskeleton-event.wearablerobots.eu

Exoskeletons and Wearable Robots: current practice and future perspectives

Why Wearable Robots?

Wearable robots, often referred to as exoskeletons, are human-assisting technologies to support workers in different industries and applications in the healthcare sector.

The exoskeletons and wearable robots industry are a young and exciting field, expanding at a rapid pace. According to a recent market study by Wintergreen Research Inc, it made **over \$130 million in 2018 and is anticipated to reach \$5.2 billion by 2025.**

Although exoskeletons are most well known, wearable robots nowadays come in many shapes and sizes, ranging from powered exoskeletons allowing for super-human strength to passive solutions to support the user's posture. These technologies range in construction from large full body support hard devices, to soft smart materials with integrated technologies.

Where to use Wearable Robots?

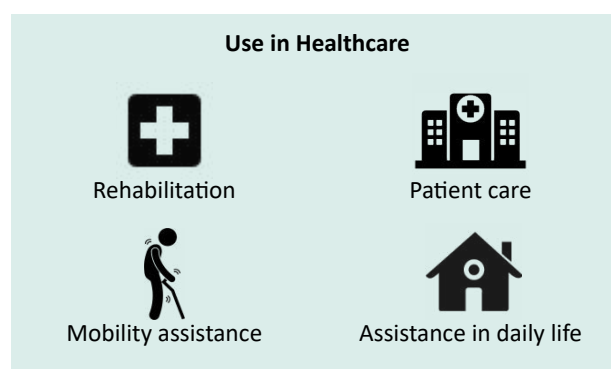
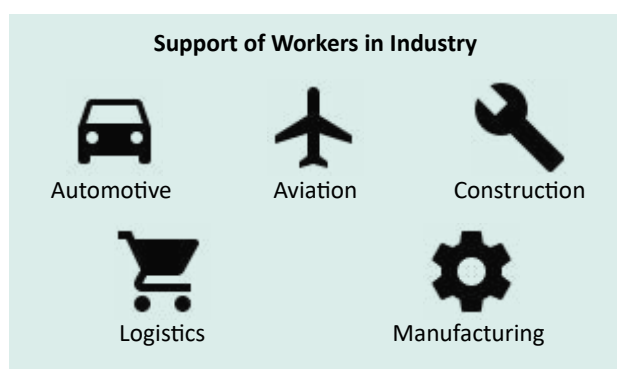
Due to their versatility, wearable robots can be used in a wide variety of application areas, from factories to hospitals. This means that the number of people who can benefit from assistive devices is immense.

Wearable Robots have also been developed to assist workers by transferring the load carried by the user or in supporting posture. These devices have been proven to help reduce work related fatigue in experimental studies. The technologies therefore have the potential to impact on the disease burden of workers, with work related **musculoskeletal disorders (MSDs) affecting around 217 million EU workers.**

Depending on where the devices can be used and for what tasks, the required type of technology will vary. However, the trend in wearable robotics is moving towards lighter and more manageable devices.

For all involved in the wearable robotics community, it is clear there is an exciting potential to develop wearable robots for the benefits of workers. The evolution of wearable robotics to mainstream technologies require further innovation and scientific development.

In healthcare, wearable robots are emerging rapidly to provide rehabilitation or assistance. The potential value is huge, by offering support for a portion of the **40 million people in Europe who cannot walk** without an aid and **the 3.2 million wheelchair users.**



Exoskeletons and Wearable Robots: current practice and future perspectives

Why attend this event?

- Unique opportunity to test wearable robotic devices
- Live demonstrations of technologies
- Presentations from leading experts
- Receive first-hand experience from different applications
- Follow current trends and challenges at an international level
- Expand your professional network
- Establish contacts for long-term partnerships

Who should attend this event?

- Operational and line managers
- Experts of working activities and conditions
- HR safety employees
- Industry representatives
- Healthcare managers
- Doctors and therapists
- Wearable robotics technology developers
- Exoskeleton service providers
- Investment professionals

Co-organisers

The **Exoskeletons and Wearable Robots: current practice and future perspectives** event is co-organised by the COST Action network CA16116 - Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions, accelopment AG, a Swiss based company specialised in EU funded research and innovation projects and Tecnia, a benchmark Research and Technological Development Centre in Europe.

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takes you further



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tecnia Inspiring Business

The **Exoskeletons and Wearable Robots: current practice and future perspectives** event is an excellent opportunity to network, build future collaborations and business partnerships. Meet leading expert in the field, as well as experienced and aspiring users of wearable robots and exoskeletons, and their developers.

This event will give you valuable insights into the world of wearable robotics if you are interested in how these devices could be implemented in your organisation to support your employees with lifting and carrying tasks and overall postural support.



This Co-organisers from the COST Action Working Group 3 – Application-domains

Simona Crea - Assistant professor, The BioRobotics Institute, Scuola Superiore Sant'Anna, simona.crea@santannapisa.it

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Leonard O'Sullivan - Senior lecturer in Ergonomics and Human Factors, Design Factors Research Group at the University of Limerick, leonard.osullivan@ul.ie

Gerdienke Prange - Human Movement Scientist, Roessingh Research and Development, g.prange@rrd.nl

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Diego Torricelli - Neural Rehabilitation Group, Cajal Institute CSIC, diego.torricelli@csic.es

Jan Veneman - Chair of the COST Action CA16116 - Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions, jan.veneman.cost@gmail.com

Itinerary

10:00-11:00	<i>Registration and coffee</i>				
11:00-11:15	Welcome to the world of exoskeletons and wearable robots Jan Veneman - Chair of the COST Action CA16116 - Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions				
11:15-11:40	Latest developments in design of wearable robots – hard vs. soft Jonathan Rossiter - Professor of Robotics University of Bristol, Department of Engineering Mathematics and Bristol Robotics Laboratory				
11:40-12:05	Degrees of Freedom: an essential perspective on exoskeleton design Herman van der Kooij - Chair of the BioMechatronics group at the Department of Biomechanical Engineering at the University of Twente				
12:05-12:30	Translating ideas into viable products Bernhard Graimann - Vice President & Head of Global Research at Ottobock SE & Co. KGaA				
12:30-13:00	Standardisation, safety and benchmarking: European efforts to support wearable robots and exoskeletons <ul style="list-style-type: none">• Jan Veneman - Wearable Robots COST Action• Gerdienke Prange - COVR project• Diego Torricelli - EUROBENCH project				
13:00-14:00	<i>Lunch and networking</i>				
14:00-15:30	Use cases from different industries: First hand experiences from robotics providers in different application domains <table><thead><tr><th>Worker support</th><th>Use in health care</th></tr></thead><tbody><tr><td><ul style="list-style-type: none">• Automotive• Aviation• Construction• Logistics• Manufacturing</td><td><ul style="list-style-type: none">• Rehabilitation• Patient care• Mobility assistance• Assistance in daily life</td></tr></tbody></table>	Worker support	Use in health care	<ul style="list-style-type: none">• Automotive• Aviation• Construction• Logistics• Manufacturing	<ul style="list-style-type: none">• Rehabilitation• Patient care• Mobility assistance• Assistance in daily life
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15:30-16:00	<i>Coffee and networking</i>				
16:00-17:00	Current issues: A step change is needed for the future applications for wearable robots Chaired by Leonard O'Sullivan - Associate Professor in Ergonomics and Human Factors in the Design Factors Research Group at the University of Limerick Interactive session and discussion on: <ul style="list-style-type: none">• The immediate challenges for wearable robots• The potential future use of wearable robots				
17:00	<i>Closing</i>				

Optional	
20:00-23:00	Networking dinner including special programme

Itinerary

09:00-9:30	User stories: An industry perspective Boudewijn Wisse - Founder & Technical Director, Laevo BV
09:30-10:00	User stories: A healthcare perspective Zlatko Matjačić - Head of Research and Development Unit at University Rehabilitation Institute, Republic of Slovenia and Full Professor of Biomechanics at University of Ljubljana, Slovenia
10:00-10:30	Next-generation soft exosuits to improve human performance and mitigate risk of injury Ignacio Galiana, PhD, Staff Engineer and Program Manager - Wearable Robotics, Wyss Institute at Harvard University
10:30-11:00	<i>Coffee and networking</i>
11:00-13:00	Live demonstrations of wearable robots: Try on and test the latest devices first-hand
13:00-14:00	<i>Lunch and networking</i>
14:00-15:00	Parallel workshops: Key issues in our industry – how to effectively implement the use of wearable robots <ul style="list-style-type: none">• Workshop 1: Worker support• Workshop 2: Use in health care
15:00 -16:00	Stakeholder roundtable: Challenges and trends of new technologies Workshop debriefing, knowledge sharing and key questions to our experts Chaired by Leonard O’Sullivan - Associate Professor in Ergonomics and Human Factors in the Design Factors Research Group at the University of Limerick
16:00	<i>Closing</i>

Invited Experts



Dr. Ignacio Galiana - Staff Engineer and Program Manager - Wearable Robotics, Wyss Institute at Harvard University

Dr. Ignacio Galiana is a Staff Engineer and Program Manager for Soft Wearable Robotic programs at the Wyss Institute at Harvard University. He leads the soft exosuit projects in the Walsh Biodesign Lab where he is responsible for managing a multi-disciplinary team of staff engineers, functional apparel designers, experts in biomechanics, physiology and clinical collaborators to develop the next generation of soft wearable exosuits that can be worn like clothing to enhance human performance and protect against injury.

Ignacio received his B.Sc. in Industrial Engineering, M.Sc. in Automation and Robotics and a Ph.D. in Automation and Control from Universidad Politécnica de Madrid in 2013 during his Ph.D. where he received multiple awards including the “best Ph.D. thesis in Europe on haptics” by the EuroHaptics society. His Ph.D. research focused on the development of human-machine interaction methods, and on the design and control of haptic devices for VR, haptics and Telerobotics. Following this, Ignacio Galiana was the technical lead for the Harvard team under the DARPA Warrior Web program to develop soft exosuits to enhance human walking performance.



Dr. Bernhard Graitmann - Vice President & Head of Global Research at Ottobock SE & Co. KGaA

Bernhard Graitmann received his PhD in Biomedical Engineering from Graz University of Technology (TU Graz) in 2002. He worked as a postdoctoral researcher at the BCI Lab, TU Graz, and at IAT, University of Bremen in bio-signal processing, pattern recognition and machine learning with applications in brain-computer communication and rehabilitation robotics. Since 2006, he has been lecturer at the Institute of Knowledge Discovery, Graz University of Technology, Austria. In 2008, he changed from academia to industry working for Otto Bock HealthCare GmbH, Germany. There he worked as scientific coordinator, Global Expert for Neurotechnology, and Head of Translational Research and Knowledge Management. Since 2018, he has been Vice President and Head of Global Research at Ottobock SE & Co. KGaA.



Prof. Dr. ir. Herman van der Kooij - Chair of the BioMechatronics group at the Department of Biomechanical Engineering at the University of Twente

Prof. Dr. ir. Herman van der Kooij received his PhD with honors (cum laude) in 2000 and is professor in Biomechatronics and Rehabilitation Technology at the Department of [Biomechanical Engineering at the University of Twente](#) (0.8 fte), and Delft University of Technology (0.2fte), the Netherlands. His expertise and interests are in the field of human balance and motor control, adaptation, and learning. He combines experiments with neuro-mechanical models. His group designed various rehabilitation, wearable, diagnostic, and assistive robots. Examples are the gait rehabilitation robot LOPES and the Mindwalker wearable exoskeleton.

He has published over 200 peer-reviewed publications in the area of biomechanics and human motor control. He has been frequently invited as (keynote) speaker at international conferences. He received several award, among were the prestigious Dutch VIDI and VICI personnel grants for excellent researchers in 2001 and 2015 respectively. He was associate editor of IEEE TBME and IEEE Robotics and Automation Letters and member of IEEE EMBS technical committee, and chair of the IEEE BIOROB2018 conference, and was member of numerous scientific program committees in the field of rehabilitation robotics, bio robotics, and assistive devices. He participated in seven EU projects and was the coordinator of the European FP7 project Symbitron. Currently he leads the Dutch national program Wearable Robotics and the Dutch national 4TU Soft Robotics program.

Invited Experts



Prof. Dr. Zlatko Matjačić - Head of Research and Development Unit at University Rehabilitation Institute, Republic of Slovenia and Full Professor of Biomechanics at University of Ljubljana, Slovenia

Prof. Dr. Zlatko Matjačić is an electrical engineer, specialized in biomedical and rehabilitation engineering and rehabilitation robotics. He obtained his PhD in electrical engineering from the University of Ljubljana, Slovenia. Zlatko Matjačić is currently Head of the Research and Development Unit at the University Rehabilitation Institute, Republic of Slovenia and Full Professor of Biomechanics at the University of Ljubljana, Slovenia. From 1st April 1998 to 31st October 2001 he held a position of Assistant Professor in world renowned Center for Sensory-Motor Interaction at Aalborg University, Denmark.

Zlatko Matjačić has been active and made significant contributions in the fields of human motion analysis and synthesis, biomechanics, control of human movement, functional electrical stimulation (FES) of extremities, rehabilitation robotics and telerehabilitation of movement. Zlatko Matjačić holds 13 international patents, two of them were commercialised as standing balance training device and walking balance training device (www.thera-trainer.de). He received “The Jožef Stefan Golden Emblem Award” for outstanding contributions made to science in doctoral thesis (2000) as well as prestigious Slovenian national “Puh Award” for excellence in transferring new scientific findings into innovative products (2012).



Prof. Dr. Leonard O'Sullivan - Associate Professor in Ergonomics and Human Factors in the Design Factors Research Group at the University of Limerick

Prof. Dr. Leonard O'Sullivan's research interests are human factors in medical device innovation and in the usability of medical products. He has a PhD in Industrial Ergonomics, a Master's degree in Safety and Ergonomics and a Bachelor's degree in Materials and Construction Technology. His interests are in wearable robotics technologies to augment human motion. In particular, his research has focused on ergonomics and user centered design aspects of hard and soft exoskeleton design.



Dr. Gerdienke Prange - Human Movement Scientist, Roessingh Research and Development

Dr. Gerdienke Prange is a human movement scientist, with a PhD in the evaluation of robotic devices for rehabilitation of the arm after stroke. As senior researcher, she currently leads the research topic on therapeutic rehabilitation technology (Active Therapeutic Devices), involving supervision of 5 PhD students up to now. She coordinates and supervises multiple European and national projects, in particular regarding clinical validation and evaluation of rehab technology, collaborating extensively with care organisations, technical universities and companies. Her research is focused on applying technology for improvement of arm and hand functionality in clinical practice or at home, evaluating its impact and understanding associated neurological and biomechanical working mechanisms. In addition, she has been a member of the Medical Ethical Research Committee in Enschede for over 4 years. Using her experience on research with medical devices and associated procedures, she's also involved in the [COVR project](#), an H2020 Innovation Action aimed at facilitating and supporting safety testing of collaborative robots.

Invited Experts



Prof. Jonathan Rossiter - Professor of Robotics University of Bristol, Dept of Engineering Mathematics and Bristol Robotics Laboratory

Prof. Jonathan Rossiter is Professor of Robotics at Bristol Robotics Laboratory and the University of Bristol. He is Royal Academy of Engineering Chair in Emerging Technologies and EPSRC Research Fellow. Jonathan is a leading innovator of soft robotics, covering the wide spectrum of development from smart materials to smart machines. He led the EPSRC research project: ‘The Right Trousers - Wearable Soft Robotics for Independent Living’, a major investigation into soft robotic lower-limb assistance and the development of core actuation and sensing technologies for wearable assistance. This fits under the broad focus of his research into bio-integrating soft robots: robots that operate in, on and with the human body to make it function better, to restore lost function and the enhance its capabilities above those it natural possesses. Jonathan Rossiter has published over 180 peer reviewed publication, patents and commercial licenses.



Dr. Diego Torricelli - Head of Neuromotor Coordination Lab at the Neural Rehabilitation Group, Spanish National Research Council (CSIC)

Diego Torricelli is the Head of Neuromotor Coordination Lab at the Neural Rehabilitation Group, Spanish National Research Council (CSIC). His research interests are the understanding of motor control principles behind coordination, the development of quantitative metrics of motor performance, and the design of robot-assisted strategies for neural rehabilitation. He is the coordinator of the [EUROBENCH Project](#), member of the ISO Technical Committee on Robotics (TC299/WG4) and founder of the international community on [Benchmarking Bipedal Locomotion](#). He organized several scientific activities, such as the Summer School on Neurorehabilitation (SSNR), the International Conference on Neurorehabilitation (ICNR), the International Workshop on (WeRob), as well as more than 20 workshops in the fields of neurorobotics, muscle synergies and benchmarking. He is co-author of more than 80 publications in peer reviewed journals and conferences. He was Associate Professor in the University Carlos III de Madrid and San Pablo CEU University.



Dr. Jan Veneman - Chair of the COST Action CA16116 - Wearable Robots for Augmentation, Assistance or Substitution of Human Motor Functions

Dr. Jan F. Veneman’s research interests include wearable and rehabilitation robotics, especially robots for mobility and balance training. He was educated as mechanical engineer and philosopher of science, technology and society; and graduated in 2007 on the “design and evaluation of the gait rehabilitation robot LOPES” at the University of Twente, the Netherlands. From 2008-2018 he continued his work in Tecnalía, a private research institute in the Basque country. Since 2018 he works as Technical Project Manager in Hocoma AG, the world-leading manufacturer of robotic devices for neuro-rehabilitation, coordinating projects in the field of lower extremity rehabilitation (gait and balance). Related to these topics, he is Scientific and Management Committee Chair of the European wide COST Action Wearable Robots (CA16116 - [wearablerobots.eu](#)) and until end 2017 was PI and coordinator of the FP7 [BALANCE project](#). He was also closely involved as expert in the development of the IEC 80601-2-78 safety standard for rehabilitation robots.



Boudewijn Wisse - Boudewijn Wisse - Founder & Technical Director, Laevo BV

Boudewijn Wisse is passionate about biomechanics, energy systems and personal development. He expresses these passions as fencing coach and business entrepreneur. After founding and managing several healthcare [Spring, Blue Sparrows] and furniture [InteSpring, Anchis] businesses, he founded and now focusses on Laevo - exoskeletons. Laevo develops a new way to prevent and alleviate (lower back) pain due to burdening working postures. “I believe that fulfilling and healthy work is a major component for a meaningful and happy life. It’s a privilege that I can combine my passions in Laevo to offer a solution that can improve this happiness factor for millions of people”.

Registration

Exhibition Location

BEC! Bilbao Exhibition Centre

Azkue Kalea, 1, 48902 Barakaldo, Bizkaia, Spain

Getting to BEC:

<https://bilbaoexhibitioncentre.com/visitors/getting-to-bec>



Opening hours

Day 1, 23 April 2020, 11:00 – 17:00 (10:00 registration)

Day 2, 24 April 2020, 09:00 – 16:00

Registration for participants

Registration to the **Exoskeletons and Wearable Robots: current practice and future perspectives** event is available online at www.exoskeleton-event.wearablerobots.eu.

2-Day tickets are valid for 23 – 24 April 2020. Tickets are available with the option of joining the networking dinner on the 23 April 2020 or without.

Only pre-sale tickets to the event are available, no onsite purchases possible. All purchased tickets are non-refundable.

Call for sponsorship and exhibitors

The **Exoskeletons and Wearable Robots: current practice and future perspectives** is inviting sponsors to actively contribute during this key networking and technology transfer event. Unique opportunities to present your innovative exoskeletons and wearable robots are available during the **live demonstrations of wearable robots**. As a sponsor you can further **present your organisation and your first hand experiences as a robotics provider** during dedicated sessions to ensure maximum exposure.

Type of ticket	Admission Price
2-Day Ticket excluding the Networking Dinner	€ 175
2-Day Ticket including the Networking Dinner	€ 250

If your organisation is interested in presenting your exoskeleton and wearable robot products through our different sponsorship packages during the Exoskeletons and Wearable Robots: current practice and future perspectives event, please send an email to jgoetz@accelopment.com for further details.



More information and registration available online www.exoskeleton-event.wearablerobots.eu