

WEARRACON CONFERENCE - 25 OCTOBER

CONFERENCE OVERVIEW

PROGRAM WEARRACON - 26 OCTOBER

Room 14, Hall 1, 1st Floor

09.00 am - 09.30 am | Arrival and registration

09.30 am - 10.00 am | Welcome speech



Photo: Dr. Christophe Maufroy

Dr. Christophe Maufroy, Fraunhofer IPA, Germany

10.00 am - 11.00 am | Keynote speech: Wearable Robotics at The BioRobotics Institute



Photo: Nicola Vitiello

Prof. Nicola Vitiello, Scuola Superiore Sant'Anna

Ageing population affects society welfare sustainability. The ageing of the population is one of the most critical challenges current industrialized societies will have to face in the next years, and threatens the sustainability of our social welfare. Among many diseases, gait disorders are common and often devastating companions of ageing, leading to reductions in quality of life and increased mortality. This presentation will introduce the research activities carried out at The BioRobotics Institute of Scuola Superiore Sant'Anna in the field of wearable robots for human movement assistance, rehabilitation and augmentation.

11.00 am - 11.30 am | Coffee break

Room 14, Hall 1, 1st Floor

Session A1 - Exoskeletons and Exosuits Technologies I

Control of active exoskeletons for industrial applications

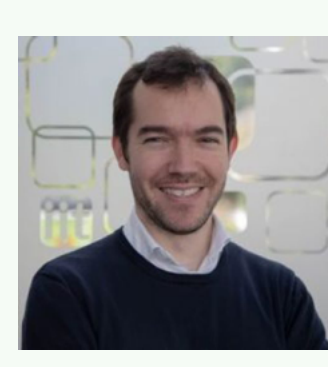


Photo: IIT

11.30 am - 12.00 am

Dr. Jesús Ortiz,
Istituto Italiano di Tecnologia

Abstract:
The successful implementation of active exoskeletons in industrial settings hinges on their ability to effectively adapt to a wide range of tasks and scenarios. Achieving this versatility relies heavily on the diversity and precision of their control strategies. In this presentation, we will delve into our latest research on control strategies for industrial active exoskeletons that assist the lower back, shoulders, and elbows, highlighting their potential to improve workplace safety and efficiency.

Development of wearable exoskeletons for effective human motion assistance



Photo: s. bai

12.00 am - 12.30 pm

Prof. Shaoping Bai,
Aalborg University

Abstract:
This talk will provide a brief overview of exoskeleton development at the Exoskeleton Lab, AAU, addressing research challenges in the assistive exoskeleton design and development. Research issues including innovative mechanism design, physical human-exoskeleton interaction, sensing and control, and performance assessment will be covered. Some novel designs and sensing methods will be introduced, along with some examples of exoskeletons for rehabilitations and for workplace assistances.

Quantification of the mechanical properties of the physical human-exoskeleton interface - Results of a subject study investigating upper arm interfaces.



Photo: Jonas Schiebl

12.30 pm - 01.00 pm

Jonas Schiebl,
Fraunhofer Institute for Manufacturing Engineering and Automation IPA

Abstract:
Forces and torques acting in physical human-exoskeleton interfaces cause relative movement of the exoskeleton with respect to the human body. Knowledge of the quantitative relationships between acting loads and the resulting relative displacements could enable more precise model-based analyses that can more accurately represent the biomechanical interaction between human and exoskeleton. We introduce an experimental setup that can be used to record such mechanical interface data experimentally. The results from a first pilot study on test subjects' upper arms including the resulting interface stiffnesses for translational and rotational motions are presented.

01.00 pm - 02.30 pm | Lunch break

CCD South, 1st Floor

02.30 pm - 04.00 pm | Poster session

04.00 pm - 04.30 pm | Coffee break

Room 14, Hall 1, 1st Floor

Session A2 - Modeling & Simulation

Simulation-based conceptual design of exoskeleton actuators



Photo: Aalborg University

04.30 pm - 05.00 pm

Prof. John Rasmussen,
Aalborg University

Abstract:
CAE simulation is usually employed in the late stages of the design process where the conceptual design is determined and most cost committed. However, a special mathematical structure of the musculoskeletal analysis problem used to simulate the influence of exoskeletons on the human body allow us to use the simulation to directly point out optimum configurations of actuators in the early stages of the design cycle. This is demonstrated using a few examples from a box lifting task.

Model-based adaptive control of trunk exoskeletons: towards bio-protective robotic technologies

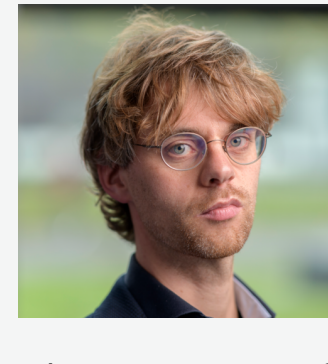


Photo: University of Twente

05.00 pm - 05.30 pm

Prof. Massimo Sartori,
University of Twente

Abstract:
This talk will provide an overview of the research my group is doing, specifically on how we're aiming to close the loop between human biology and robotic technology ultimately for protecting biological tissues from injuries in assistive and occupational domains. The talk will present advances at the intersection between physiologically correct musculoskeletal modelling, realtime model-based control and wearable robotic technologies with a focus on the human trunk.

DigitalEconomics - Digital Work Planning and Ergonomic Assessment for the Use of Industrial Exoskeletons



Photo: imk Industrial Intelligence GmbH

05.30 pm - 06.00 pm

Prof. Lars Fritzsche,
imk Industrial Intelligence GmbH

Abstract:
This presentation will give insights to a current research project named "DigitalEconomics", founded by the German Ministry of Education and Research. Purpose of the project is to develop and validate methods for the digital testing and assessment of exoskeletons in industrial use cases. This includes the use of biomechanical and kinematic digital human models (ema Work Designer and Anybody Modelling System), as well as a markerless motion capturing system (The Captury). Results from laboratory studies and field pilots will be presented.

Room 15, Hall 1, 1st Floor

Session B1 - Assessment and Human Factors I

Evaluation of passive and active exoskeletons using wearable sensors and Digital Human Models

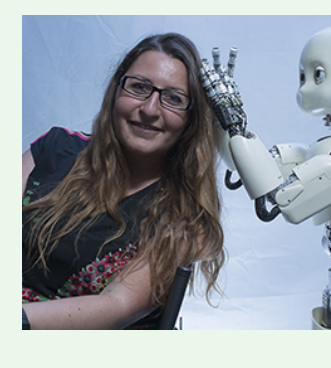


Photo: Emile Loraux

11.30 am - 12.00 am

Prof. Serena Ivaldi,
INRIA

Abstract:
The talk overviews the methodologies we developed to evaluate the use of passive and active exoskeletons, including wearable sensors and Digital Human Models. In the case of passive exoskeletons, we also discuss the deployment in a hospital for assisting medical staff.

Lessons Learned from Evaluating Industrial Exoskeletons



Photo: Elisa Ambach

12.00 am - 12.30 pm

Lennart Ralfs,
Universität Innsbruck

Abstract:
The lecture addresses a mixed-method approach to the evaluation of industrial exoskeletons, which enables a multi-layered analysis of the effects of exoskeletons and the work processes. For this purpose, exemplary study results address the biomechanical effect, ergonomics, or acceptance and usability of exoskeletons. The many years of knowledge and experience are summarized in recommendations for action and a guideline that can contribute to the targeted practical use of exoskeletons in industrial applications.

The assessment of the Exo4Work shoulder exoskeleton



Photo: Sander De Bock

12.30 pm - 01.00 pm

Dr. Sander De Bock,
Vrije Universiteit Brussel

Abstract:
Within the Exo4Work project, a new passive shoulder exoskeleton was designed. Subsequently, we tested how the support of the exoskeleton affects muscle activity and fatigue, and how it influences the performance during overhead work.

06.00 pm | Come together with BASI