

Croatian Ergonomics Society

BOOK OF ABSTRACTS

**9th INTERNATIONAL ERGONOMICS
CONFERENCE**

ERGONOMICS 2022

**December 7-10, 2022
ZAGREB
CROATIA**

Title: **Book of abstracts of the 9th International Ergonomics Conference -
*ERGONOMICS 2022***

Publisher: **Croatian Ergonomics Society**

Editors: **Ivana Salopek Čubrić, Goran Čubrić, Jurica Ivošević, Kristian Jambrošić, Davor Sumpor**

Reviewers: **Shamsul Bahri Mohd Tamrin, Blaženka Brlobašić Šajatović, Tino Bucak, Denis Coelho, Goran Čubrić, Danijela Domljan, Anca Draghici, Bernard Dugué, Darina Dupláková, Goran Đukić, Alin Gaureanu, Szabó Gyula, Hrvoje Haramina, Kristian Jambrošić, Tanja Jurčević Lulić, Evgeniy Lavrov, Jasna Leder Horina, Renata Hrženjak, Abhijit Majumdar, Budimir Mijović, Diana Milčić, Melita Milenković, Beata Mrugalska, Alessandro Naddeo, Tihomir Opetuk, Georgius Priniotakis, Nebojša Rašović, Hassan Sadeghi Naeini, Ivana Salopek Čubrić, Davor Sumpor, Irena Šabarić, Adisa Vučina, Ray Yair Lifshitz, Emilija Zdraveva, Mislav Stjepan Žebec**

ISSN: 2757-0517 (print)

ISSN: 2757-0525 (USB)

Circulation: 60 copies

Printed by: **University of Zagreb, Faculty of Transport and Traffic Sciences**

Editor's Note

The editors of the publication are not responsible either for the statements made, or for the opinions expressed in the publication. The Book of Abstracts (ISSN: 2757-0517 Print and ISSN: 2757-0525 USB) contains reviewed and accepted abstracts in English. All rights are reserved by the *Croatian Ergonomics Society*, and the content may not be reproduced, downloaded, disseminated, published, or transferred in any form or by any means, except with the prior written permission of the Publisher.

The post-conference Proceedings titled "*Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022*" was published by the Springer Publishing Co. and contains reviewed and accepted full text papers. The ISSN numbers of the series "*Advances in Intelligent Systems and Computing*" where the Proceedings was included are: ISSN: 2194-5357 (print) and e-ISSN: 2194-5365 (available online).



POWERED SMART TEXTILE-BASED EXOSKELETON FOR HUMAN SUPPORT MOVEMENT

C. Ferreira¹, A. Fertuzinhos¹, R. Silva¹, M. Ramalho¹, B. Vale¹, J. Silva¹, L. Costa², C. Oliveira²,
A. Ramôa², F. Aguiar², A. Pilastris³, A. Matta³, P. Dias³, R. Sampaio³, D. Machado³, M. Costa⁴, A.
Roças⁴, P. Madureira⁵, J. Moreira^{5,6}, J. R. Pereira⁷, C. Pereira⁷, F. B. Pereira⁷

¹CeNTI – Centre for Nanotechnology and Smart Materials, PORTUGAL, cferreira@centi.pt

²CITEVE – Centro Tecnológico das Indústrias Têxtil e Vestuário de Portugal, PORTUGAL, aflorinda@citeve.pt

³Associação C.C.G /ZGDV Centro de Computação Gráfica, PORTUGAL, andre.pilastris@ccg.pt

⁴LMA – Leandro Manuel Araújo, S.A., PORTUGAL, marta.costa@lma.pt

⁵Fraunhofer Portugal AICOS, PORTUGAL, pedro.madureira@fraunhofer.pt

⁶Center for Rehabilitation Research – Human Movement System (Re)habilitation Area, Department of
Physiotherapy, School of Health, Polytechnic of Porto, PORTUGAL, jmo@ess.ipp.pt

⁷PAFIL, PORTUGAL, jrui.pereira@pafil.pt

Abstract

Industrial environments require people's physical efforts related to excessive force, poor posture, and repetitive tasks that increase the risk of developing musculoskeletal diseases. Due to the high prevalence of postural complaints and consequent global health burdens, a significant demand has been conducted to build and implement powered lower and upper limb devices for human enhancement, considering the working layout/position, anthropometric and ergonomic data to generate valuable information for posture correction guidance.

STVgoDigital aims to support repetitive seamstress movements by developing a textile-based exoskeleton that reduces physical efforts, unnecessary movements, fatigue symptomatology and pain. The main goal of STVgoDigital is to support the transition to Worker 4.0 generation through the development of an exoskeleton that integrates a sensing component that monitors workers' activity in real-time, identifying its ergonomic posture, which feeds the actuation component. This exoskeleton will support the execution of movements inherent to some professional activities.

The approach identified specific worker needs (physical and cognitive ergonomics, thermic and sensorial comfort), which were later used to design the best structure for the exoskeleton. The active systems will be connected to a global communication device responsible for providing the respective outputs. This solution will be tested on-site, measuring the response of electromyography sensors to overcome physical discomfort and alignment issues with the human body anatomy, which are common tradeoffs of these innovative products. STVgoDigital aims to adapt to flexible, dynamic and data-enriched environments, contributing to greater integration of an IoT ecosystem in a garment.

Keywords: exoskeleton, sensing, actuation, muscles, textile garments

Address of the paper's corresponding co-author who will also be the presenter at the Conference:

Mr. César Ferreira
CeNTI – Centre for Nanotechnology and Smart Materials
Rua Fernando Mesquita, 2785
4760-034, VN Famalicão
Portugal
cferreira@centi.pt

