

Croatian Ergonomics Society

BOOK OF ABSTRACTS

**9th INTERNATIONAL ERGONOMICS
CONFERENCE**

ERGONOMICS 2022

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



9th International Ergonomics Conference - *ERGONOMICS 2022*

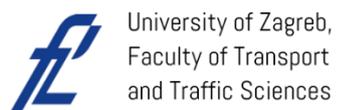
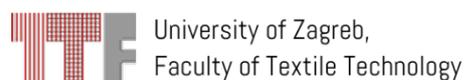
The Conference is **organized by**:



The Conference is **endorsed by**:



The Conference is **co-organized by**:



9th International Ergonomics Conference

- *ERGONOMICS 2022*

The Conference is organized **under the auspices of:**



Ministry of Labour, Pension System, Family and Social
Policy of the Republic of Croatia



Croatian Academy of Engineering

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).

INTERNATIONAL SCIENTIFIC COMMITTEE

Kristian Jambrošić, Croatia (Scientific Committee President)
Shamsul Bahri Mohd Tamrin, Malaysia
Tino Bucak, Croatia
Denis Coelho, Sweden
Ivana Salopek Čubrić, Croatia
Apurba Das, India
Bernard Dugué, France
Jose Orlando Gomez, Brazil
Szabó Gyula, Hungary
Ray Yair Lifshitz, Israel
Tanja Jurčević Lulić, Croatia
Abhijit Majumdar, India
Budimir Mijović, Croatia
Diana Milčić, Croatia
Beata Mrugalska, Poland
Alessandro Naddeo, Italia
Georgius Priniotakis, Greece
Nebojša Rašović, Bosnia and Herzegovina
Uwe Reischl, USA
Davor Sumpor, Croatia
Adisa Vučina, Bosnia and Herzegovina
Eric Min-Yang Wang, Taiwan
Emilija Zdraveva, Croatia

ORGANIZING COMMITTEE

Ivana Salopek Čubrić, Croatia (Organizing Committee President, General President)
Tino Bucak, Croatia
Goran Čubrić, Croatia
Anca Draghici, Romania
Szabó Gyula, Hungary
Jurica Ivošević, Croatia
Tanja Jurčević Lulić, Croatia
Jasna Leder Horina, Croatia
Dorotea Kovačević, Croatia
Diana Milčić, Croatia
Beata Mrugalska, Poland
Elma Mulaomerović, Taiwan
Ivanka Nikolić, Croatia
Davor Sumpor, Croatia
Irena Šabarić, Croatia
Sandro Tokić, Croatia

PROGRAM COMMITTEE

Davor Sumpor, Croatia (Program Committee President)
Goran Čubrić, Croatia
Kristian Jambrošić, Croatia
Tanja Jurčević Lulić, Croatia
Ivana Salopek Čubrić, Croatia
Aleksandr Volosiuk, Russia
Eric Min-Yang Wang, Taiwan

TECHNICAL COMMITTEE

Jasna Leder Horina, Croatia (Technical Committee President)
Božena Jurčić, Croatia
Ivanka Nikolić, Croatia
Irena Šabarić, Croatia
Sandro Tokić, Croatia

Preface to the Book of abstracts

Dear colleagues and dear friends!

The Croatian Ergonomics Society (CrES) has organized the 9th *International Ergonomics Conference - ERGONOMICS 2022* in Zagreb, Croatia. We are proud that this conference is part of the series "Ergonomics" organized by CrES since 2001 with the aim to promote ergonomics worldwide. The fact that we are in Zagreb in December, when the world-famous Zagreb Advent season is back in full glory, makes this venue and the conference even more special.

The organization of the conference is traditionally a joint project of the three faculties - University of Zagreb Faculty of Transport and Traffic Sciences (FPZ), University of Zagreb Faculty of Mechanical Engineering and Naval Architecture (FSB), and University of Zagreb Faculty of Textile Technology (TTF). As in previous years, the conference is endorsed by the International Ergonomics Association (IEA), the Federation of European Ergonomics Societies (FEES), and the Acoustical Society of Croatia (ASC).

Over the years, this conference has brought together enthusiasts, experts and scientists from Croatia and from all over the world. Our big Ergonomics family has grown over the years. We always eagerly look forward to meeting old friends, and making new acquaintances here. At this year's edition of the conference, participants came from 21 countries, namely Bosnia and Herzegovina, Brazil, Croatia, France, Germany, Greece, Hungary, India, Israel, Italy, Japan, Malaysia, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, South Korea, Ukraine, and the United States of America.

All submissions were reviewed and 47 abstracts were accepted for publication and presentation at the conference. The post-conference Proceedings consist of double peer-reviewed full texts of the accepted abstracts and will be published by the Springer Publishing Co. as "Proceedings of the 9th International Ergonomics Conference - ERGONOMICS 2022" in the series "Advances in Intelligent Systems and Computing series.

As President of CrES, and as conference President, I would like to express my deep appreciation to the members of the conference committees involved in this challenging organization (unfortunately, still in the pandemic era), as well as to all the supporting organizations that all together have once again made this conference in the "Ergonomics" series possible and a success. My sincere thanks go to all the participants for their valuable contribution, which makes the picture valuable and real.

We hope that all participants had a very pleasant stay in Zagreb and will return home with positive impressions and new scientific ideas. As in the last two decades, we cordially invite you to participate in our anniversary 10th conference, and to spread the word to your colleagues so that our Ergonomics family continues to grow.

Sincerely,



Assoc. Prof. Ivana Salopek Čubrić, PhD
President of the Croatian Ergonomics Society
Ergonomics 2022 Conference President



CONTENTS

Invited lecture:

- J. O. Gomes
The IEA Facing the Challenges in a World of Work 1

Session Papers:

- M. Bačić, Z. Pandur, M. Landekić, M. Šušnjar, M. Bakarić, M. Šporčić
STARTING A CHAINSAW: A POSTURAL LOAD ASSESSMENT 2
- Ľ. Baka
JOB DEMANDS AND WELL-BEING AT WORK. THREE-WAVE STUDY ON THE HEALTH
IMPAIRMENT PROCESS AMONG SOCIAL SERVICE WORKERS 3
- D. Bartulović, S. Steiner
PREDICTIVE SAFETY RISK ASSESSMENT METHODS APPLICABLE IN AVIATION
ERGONOMICS 4
- B. Brlobašić Šajatović, S. Petrak
APPLICATION AND ADVANTAGE OF 3D BODY SCANNING IN THE ERGONOMIC DESIGN
OF A SITTING WORKPLACE 5
- V. Chellappa, J. Singh Chauhan, Zuzana Strukova
ERGONOMIC RISK ASSESSMENT FOR CONCRETE FORMWORK ACTIVITIES IN
CONSTRUCTION USING DIGITAL HUMAN MODELLING 6
- G. Čubrić, I. Salopek Čubrić, A. Bojko
EVALUATING THE TACTILE COMFORT OF KNITTED SPORTSWEAR DEPENDING ON THE
GENDER OF THE PARTICIPANTS 7
- G. Čubrić, P. Čurković
3D PRINTING OF SOFT ANTHROPOMORPHIC GRIPPERS 8
- D. D. I. Daruis, D. Mohamad, N. K. C. Khamis
ERGONOMICS IN SMALL HOME-BASED INDUSTRIES: BATIK MAKING IN MALAYSIA 9
- D. Duplakova, J. Duplak, Lj. Janjetović, D. Kojić
STUDY OF THE IMPACT OF QUANTITATIVE LIGHTING PARAMETERS AS A PHYSICAL
AGENT TO THE HEALTH OF WORKERS DURING THE MANUFACTURING PROCESS 10
- C. Adam, K. Bengler, S. Berger, C. Brandl, B. Emmermann, M. Hajdari, V. Nitsch, G. Ott, S. Pütz, M.
Schmauder
FUTURE RELEVANCE OF IDENTIFIED ORGANIZATIONAL MEASURES FOR COPING WITH
THE COVID-19 PANDEMIC: A DELPHI STUDY 11
- F. Faragó, G. Szabó
QUALITATIVE ASSESSMENT OF THE OCCUPATIONAL HEALTH AND SAFETY
KNOWLEDGE MANAGEMENT PRACTICES OF HUNGARIAN COMPANIES 12
- C. Ferreira, A. Fertuzinhos, R. Silva, M. Ramalho, B. Vale, J. Silva, L. Costa, C. Oliveira, A. Ramôa, F.
Aguiar, A. Pilastrri, A. Matta, P. Dias, R. Sampaio, D. Machado, M. Costa, A. Roças, P. Madureira, J.
Moreira, J. R. Pereira, C. Pereira, F. B. Pereira
POWERED SMART TEXTILE-BASED EXOSKELETON FOR HUMAN SUPPORT MOVEMENT 13



T. Cvahte Ojsteršek, B. Gajšek THE USEFULNESS OF EYE-TRACKING GLASSES IN THE TECHNOLOGICAL UPGRADE OF THE MANUAL WORKPLACE – AN ERGONOMIC ASPECT	14
H. Haramina, I. Toš, F. Batrla INFLUENCE OF TRAIN ROUTE SETTING FUNCTIONS AUTOMATION ON RAILWAY TRAFFIC EFFICIENCY	15
R. Hrženjak, K. Doležal REGIONAL DIFFERENCES AND BODY MASS INDEX FOR POPULATION OF CROATIAN BOYS	16
J. Jeong, S. Kim, D. Kim, S. Jin COMPARISON OF VARIOUS NON-DRIVING RELATED TASK CONDITIONS ON THE TAKE- OVER PERFORMANCE IN THE CONDITIONALLY AUTOMATED DRIVING	17
M. Čeradar, T. Jurčević Lulić, J. Leder Horina, D. Domljan PRESSURE DISTRIBUTION WHEN SITTING ON A HARD SURFACE WITHOUT CUSHIONING – A CASE STUDY	18
J. Kamińska, Ł. Kapica, J. Radosz MENTAL LOAD OF OFFICE WORKERS IN VARIOUS ACOUSTIC CONDITIONS	19
L. Kapica, L. Baka, A. Najmiec PSYCHOSOCIAL FACTORS AS PREDICTORS OF WORK ABILITY AMONG POLISH WORKERS	20
Y. Kitazawa, Y. Sugawara, M. Takeda THE FORMULATION FOR HUMAN FINGER-MACHINE CONTACT INTERACTION CONSIDERING NONLINEAR FLEXIBILITY AND NON-SMOOTHNESS SLIPPING BY MULTIBODY DYNAMICS APPROACH	21
D. Kovačević, M. Brozović, D. Mustić USING EYE-TRACKING DATA TO INVESTIGATE THE NOTICEABILITY OF SAFETY PICTOGRAM ON TRANSPARENT PACKAGING	22
E. Lavrov ERGONOMICS IN UKRAINE	23
E. Lavrov, O. Siryk DECISION SUPPORT FOR SOLVING PROBLEMS OF ERGONOMIC PROVISION OF CONTACT CENTERS	24
A. Mailloux, J. Dinet RECOMMANDATIONS FOR AN INNOVATIVE DISTANCE CONTINUING EDUCATION DEVICE INTENDED FOR ORTHODONTIC PRACTITIONERS	25
C. S. Mammias, A. S. Mamma INNOVATIVE TRAINING NETWORKS FOR INTERACTIVE E-LEARNING OF THE COGNITIVE ERGONOMICS OF THE REMOTE E-MULTIDISCIPLINARY TEAM BOARD IN BREAST CANCER, ENHANCED BY AI AND BIG DATA ANALYTICS FOR DECISION MAKING AND TREATMENT	26



C. S. Mammas, A. S. Mamma INTERACTIVE E-LEARNING AND E-TRAINING ENHANCED BY AI AND BIG DATA ANALYTICS OF COGNITIVE ERGONOMICS OF THE REMOTE E-MULTIDISCIPLINARY BOARD IN LIVER CANCER	27
H. Marciano, G. Luria, N. Cohen-Moravia TRANSPORTATION PREFERENCES AND RISKS PERCEPTION DURING THE COVID-19 ERA	28
L. A. Mariano, I. Priadythama, P. Y. Loh, S. Muraki EFFECT OF GAMING CONTROLLERS ON WRIST ANGLES	29
P. K. Mikačić, T. Bucak ASSESSMENT OF ACOUSTICAL ERGONOMICS WITHIN CESSNA CITATION CJ2 AIRCRAFT	30
D. Milčić, A. Vučina, M. Bošnjak ERGONOMIC DESIGN OF THE HAND SAW HANDLE	31
M. Młynarczyk, J. Orysiak, J. Jankowski THE AIR GAPS IN THE PROTECTIVE CLOTHING	32
F. Adinolfi, V. A. Faustini, A. Terracciano, A. Yalcin, R. Califano, N. Cappetti, A. Naddeo REACHABILITY SIMULATION OF CAR DASHBOARD COMMANDS: A COMPARISON BETWEEN DELMIA™ V5 AND UNREAL ENGINE™ V4	33
N. P. Neag, A. Draghici, M. Boatca ERGONOMICS FOR EMPLOYEES' SATISFACTION IN LEAN MANUFACTURING SYSTEMS	34
N. P. Neag, M. Boatca, A. Draghici OCCUPATIONAL SAFETY WITH ARTIFICIAL INTELLIGENCE APPLICATION FOR ERGONOMIC RISK ASSESSMENT	35
J. Orysiak, M. Młynarczyk, P. Tomaszewski, P. Prus HYDRATION STATUS ASSESSMENT BASED ON BODY MASS, URINE COLOR AND THIRST IN WORKERS	36
J. Pibernik, A. Mojić, J. Dolić, L. Mandić THE ADVANTAGES OF DIARY STUDY AS A PRODUCT FEATURES RESEARCH METHOD	37
J. Rauscher EVACUATION PLANNING FOR HOSPITAL DEPARTMENTS – TIME ESTIMATION	38
U. Reischl, C. Colby THE ERGONOMICS OF BLOOD PRESSURE MEASUREMENT	39
S. Toktaş, I. Salopek Čubrić, A. Petrov INFLUENCE OF SIMULATED OUTDOOR WEAR ON THE PERFORMANCE OF SPORTSWEAR FOR A PROFESSIONAL FOOTBALL PLAYER	40
M. Soldo, N. Rašović, A. Vučina ERGONOMIC DESIGN OF THE PET BOTTLE FOR MAXIMUM USABILITY	41
I. Šabarić, F. Karin, M. Bodrožić ERGONOMIC ASPECTS OF THE DAUGHTERS OF MARY, HELP OF CHRISTIANS', PASTORAL HABIT AND SUGGESTIONS FOR ITS IMPROVEMENT	42



A. Tarbuk, I. Čorak, S. Brnada, T. Dekanić THE UV PROTECTION OF CATIONIZED COTTON/POLYESTER BLEND	43
S. Tokić, D. Sumpor, M. Zelenika Zeba, S. Đuranović ANALYSIS OF THE POSSIBLE IMPACT OF CABIN DISTRACTIONS ON THE PERFORMANCE OF YOUNG FEMALE ROAD VEHICLE DRIVERS	44
A. Smolin, J. Didevich, A. Dzhumagulova, A. Balkanskii, A. Spiridonova, L. Sopronenko, Y. Magina, A. Volosiuk "NEUROTAFL" SOFTWARE AND HARDWARE SYSTEM FOR INCLUSIVE EDUCATION	45
N. Tulikov, A. Smolin, D. Shtennikov, A. Lysenko, E. Ivanova, I. Klimov, A. Mironov, A. Volosiuk VIRTUAL REALITY APPLICATION IN MAXILLOFACIAL AND PLASTIC SURGERY	46
J. Vujević, K. Jambrošić ONLINE APPLICATION FOR FAST PURE TONE AUDIOMETRY IN NON-LABORATORY CONDITIONS	47



THE IEA FACING THE CHALLENGES IN A WORLD OF WORK

J. O. Gomes

International Ergonomics Association, Rio de Janeiro, Brazil, President@iea.cc

Abstract

Transformations in the world of work in this century are accelerating in a way never seen before. Disruptive technologies, the result of advances in science and technology, have dramatically impacted the way we work and live in our societies.

Added to this are the recent impactful impacts of the Covid-19 pandemic, which have further accelerated the deployment of disruptive technologies in the world of work. This whole context requires a deep understanding and effective response within the scope of the discipline of Human Factors and Ergonomics.

In this sense, the IEA (International Ergonomics Association) and other stakeholders have been challenged to deal with this enormous challenge and have been putting into practice actions and strategies, such as the 7 Strategic Policies in parallel with coordinated actions with federated societies, regional networks and mainly with relevant social actors such as academia, industry and other international institutions in order to adequately respond to these tremendous challenges.

Keywords: *ergonomis, human factos, work, work, disruptive technologies*

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

Prof. Jose Orlando Gomes
International Ergonomics Association
Industrial Engineering Department & Graduate Program in Informatics
Federal University of Rio de Janeiro
Rua Afonso Pena, 187/403, Tijuca
20.270-244, Rio de Janeiro, RJ
Brazil
President@iea.cc





STARTING A CHAINSAW: A POSTURAL LOAD ASSESSMENT

M. Bačić¹, Z. Pandur², M. Landekić³, M. Šušnjar⁴, M. Bakarić⁵, M. Šporčić⁶

¹University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA,
mbacic1@sumfak.hr

²University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA,
zpandur@sumfak.hr

³University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA,
mlandekic@sumfak.hr

⁴University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA,
msusnjar@sumfak.hr

⁵University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA,
mbakaric@sumfak.hr

⁶University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA,
msporcic@sumfak.hr

Abstract

A gasoline-powered chainsaw is still an irreplaceable tool in forest harvesting operations. Operating a chainsaw requires training and skill since it is a potentially dangerous tool if not operated according to the safety guidelines. Safely starting a chainsaw is often overlooked in practice which can cause serious physical injuries. To safely start a chainsaw, the operator has two options; starting from a ground position or starting a chainsaw secured between the operator's legs. The suggested options can lead to awkward body postures and consequently increased postural load. More so if the operator is starting a chainsaw multiple times a day. A sample of 67 workers on felling and processing was recorded with a video camera. Frames that include the chainsaw starting procedure were isolated, extracted, and assessed in Ergofellow 3.0 using REBA (rapid entire body assessment) tool. Results show that almost 50% of chainsaw operators ignored safety instructions and preferred "drop starting" a chainsaw. Obtained REBA scores show significant differences between three methods of starting a chainsaw.

Keywords: chainsaw, starting a chainsaw, postural load, REBA

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

Mr. Marin Bačić
Institute of Forest Engineering
University of Zagreb Faculty of Forestry and Wood Technology
Svetošimunska cesta 23
10000, Zagreb
Croatia
mbacic1@sumfak.hr





JOB DEMANDS AND WELL-BEING AT WORK. THREE-WAVE STUDY ON THE HEALTH IMPAIRMENT PROCESS AMONG SOCIAL SERVICE WORKERS

L. Baka

Department of Ergonomics, Central Institute for Labour Protection – National Research Institute, POLAND,
lukbaka@gmail.com

Abstract

The study was aimed to test the health impairment process, postulated by the job demand-resources theory (JD-R). The JD-R model explains the mechanism of the development of depression as a result of the long-term effects of excessive job demands and prolonged job burnout. According to this process, prolonged job demands contribute to the development of job burnout, which in the long run results in depression. The health impairment process was verified in the cross-lagged study, with three measurements (with an eight-month interval between measurements), conducted during the COVID-19 pandemic. The study included social service workers (N = 750). Two types of emotional demands, typical for this professional sector (related to caring and related to hiding emotions), two components of burnout (exhaustion and disengagement from work) and depressiveness were taken into account. With the use of structural equation modeling, the direct and indirect (with the participation of occupational burnout) effect of emotional demands on depression were tested. It was examined whether two types of emotional demands (measured in measurement 1) are a predictor of exhaustion and disengagement from work (measured in measurement 2), and these in turn lead to depression (measured in measurement 3). The results confirmed partly the health impairment process. Demand for hiding emotions (but not demand related to caring) was predictor high exhaustion and high depression. Exhaustion (but not disengagement from work) mediated this relation.

Keywords: *health impairment process, job demands-resources model, job burnout, depression, prospective study*

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

Mr. Łukasz Baka
Department of Ergonomics
Central Institute for Labour Protection – National Research Institute
Czerniakowska 16
00-701, Warszawa
Poland
lukbaka@gmail.com





PREDICTIVE SAFETY RISK ASSESSMENT METHODS APPLICABLE IN AVIATION ERGONOMICS

D. Bartulović¹, S. Steiner²

¹Faculty of Transport and Traffic Sciences, CROATIA, dbartulovic@fpz.unizg.hr

²Faculty of Transport and Traffic Sciences, CROATIA, ssteiner@fpz.unizg.hr

Abstract

Ergonomics ensures the tools, procedures, and environment that employees use is appropriate to fit the employee's job requirements and personal capabilities. Ergonomic hazards are situations in workplace that can cause human failure. This can include repetition, awkward posture, forceful motion, stationary position, direct pressure, vibration, extreme temperature, noise, work stress, and other. In aviation, the SHELL model is a conceptual model that defines the relationship between aviation system environment and the human component. Overall goal is to improve human performance with respect to health, safety, and work environment. Performance measurement and risk assessment of any operator in aviation are fundamental to management planning and control activities. To achieve this purpose, safety risk assessment methods are developed and used. This paper provides the overview of safety risk assessment methods in ergonomics such as Systems-Theoretic Process Analysis (STPA) method, the Event Analysis of Systemic Teamwork Broken Links (EAST-BL) method, and the Network Hazard Analysis and Risk Management System (Net-HARMS) method, with the special emphasis on predictive safety risk assessment methods such as Lumbar Motion Monitor Method, the Occupational Repetitive Action (OCRA) Methods (OCRA Index and OCRA Checklist), Systematic Human Error Reduction and Prediction Approach (SHERPA), Task Analysis for Error Identification (TAFEI), the Multiple Resources Time-Sharing Model (MRTSM), the Situational Awareness Global Assessment Technique (SAGAT), and the Adaptive Neuro-Fuzzy Inference Systems (ANFIS). Paper outlines the advantages and applicability of predictive safety risk assessment methods in aviation ergonomics.

Keywords: *predictive, safety, risk assessment methods, aviation, ergonomics*

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

Mrs. Dajana Bartulović
Department of Air Transport
Faculty of Transport and Traffic Sciences
Vukelićeva 4
10000, Zagreb
Croatia
dbartulovic@fpz.unizg.hr





APPLICATION AND ADVANTAGE OF 3D BODY SCANNING IN THE ERGONOMIC DESIGN OF A SITTING WORKPLACE

B. Brlobašić Šajatović¹, S. Petrak¹

¹University of Zagreb Faculty of Textile technology, CROATIA, blazenka.brlobasic@tff.unizg.hr

Abstract

The paper deals with researching the advantages of anthropometric measurements using a 3D body scanner. The working principle of the VITUS Smart laser 3D scanner is described, on which measurements were made for the purposes of this research according to ISO 20685-1:2018 standards. Anthropometric measurements obtained by applying this measurement are more accurate, precise and repeatable. The paper selected the anthropometric measures that are used in the ergonomic design of the workplace for the computer, and highlighted the advantages but also the disadvantages of measuring with a 3D scanner.

Keywords: *anthropometry, ergonomics, 3D scanner*

Address of the paper's corresponding co-author:

Mrs. Blaženka Brlobašić Šajatović
University of Zagreb, Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000, Zagreb
Croatia
blazenka.brlobasic@tff.unizg.hr





ERGONOMIC RISK ASSESSMENT FOR CONCRETE FORMWORK ACTIVITIES IN CONSTRUCTION USING DIGITAL HUMAN MODELLING

V. Chellappa¹, J. Singh Chauhan¹, Z. Strukova²

¹Department of Design, Indian Institute of Technology Guwahati, INDIA, vigneshkumarchellappa@gmail.com

²Faculty of Civil Engineering, Technical University of Košice, SLOVAKIA, zuzana.strukova@tuke.sk

Abstract

Construction workers are at high risk of musculoskeletal disorders (MSDs) during formwork operations. This study adopted a mixed-method approach, including site observations and evaluation of worker postures using digital human modelling (DHM) to assess the MSDs risk involved in formwork operations. The CATIA V5 software was used to conduct Rapid Upper Limb Assessment (RULA), as the workers associated with formwork operations mostly use their upper body. A video camera was used to record the working cycle postures of workers during their routine tasks. Three significant postures were selected that could develop a high risk of MSDs during formwork operations. The findings indicated a high level of discomfort to the arms, neck, trunk, and wrist, which could result in long-lasting harm to the workers. The recommendations are proposed to avoid and reduce the signs of MSD risk caused by the original operations. This study is essential since an ergonomically well-designed environment increases workers' comfort and productivity.

Keywords: concrete formwork, ergonomics, MSDs, construction, DHM

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

Mr. Vigneshkumar Chellappa
Department of Design
Indian Institute of Technology Guwahati
781039, Guwahati
India
vigneshkumarchellappa@gmail.com





EVALUATING THE TACTILE COMFORT OF KNITTED SPORTSWEAR DEPENDING ON THE GENDER OF THE PARTICIPANTS

G. Čubrić¹, I. Salopek Čubrić², A. Bojko³

¹University of Zagreb Faculty of Textile technology, CROATIA, goran.cubric@tff.unizg.hr

²University of Zagreb Faculty of Textile technology, CROATIA, ivana.salopek@tff.unizg.hr

³University of Zagreb Faculty of Textile technology, CROATIA, andrea.bojko@tff.unizg.hr

Abstract

Given that customers make sportswear purchases based on their visual and sensory perceptions, research that examines consumers' perceptions of tactile comfort is crucial in the field of sportswear. As a result, more effort must be put into understanding sportswear characteristics in relation to the human senses. This paper involved 20 assessors, aged 20 to 25, including 10 males and 10 women that evaluated the tactile comfort of knitted sportswear. Four significant bipolar properties are assessed: stiffness-softness, roughness-smoothness, non-stretchable-stretchable, and thick-thin. The study indicated that female assessors gave on average higher grades than male assessors. In addition, both genders correctly indicated the material with the highest proportion of elastane as the most stretchable.

Keywords: yarn, material, tactile comfort, subjective method, sportswear, knitted fabric

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

Mr. Goran Čubrić
Department of clothing technology
University of Zagreb, Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000, Zagreb
Croatia
goran.cubric@tff.unizg.hr





3D PRINTING OF SOFT ANTHROPOMORPHIC GRIPPERS

G. Čubrić¹, P. Čurković²

¹University of Zagreb Faculty of Textile technology, CROATIA, goran.cubric@tff.unizg.hr

²University of Zagreb Faculty of Mechanical Engineering and Naval Architecture, CROATIA,
petar.curkovic@fsb.unizg.hr

Abstract

Soft robotics is an area of robotics that relies on technologies to mimic the physical characteristics of living organisms. It is a form of biomimicry, which imitates the movement processes of soft bodies in nature to enable the robot to move smoothly and in a complex way simultaneously. This enables the soft robotic grippers to naturally conform to the object being grasped. In this study, we use the Prusa i3 3D printer to develop a soft anthropomorphic hand and test it for grasping of different objects. We compare a simplified three finger and a five finger anthropomorphic configuration.

Keywords: *soft robotics, pneumatic actuator, anthropomorphic hand*

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

Mr. Goran Čubrić
Department of clothing technology
University of Zagreb, Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000 Zagreb
Croatia
goran.cubric@tff.unizg.hr





ERGONOMICS IN SMALL HOME-BASED INDUSTRIES: BATIK MAKING IN MALAYSIA

D. D. I. Daruis¹, D. Mohamad², N. K. C. Khamis³

¹ National Defense University of Malaysia, MALAYSIA, dian@upnm.edu.my

² Universiti Malaysia Kelantan, MALAYSIA, darliana.m@umk.edu.my

³ Universiti Kebangsaan Malaysia, MALAYSIA, kamaliana@ukm.edu.my

Abstract

This paper aims to review the ergonomics study related to the batik industry, especially in Malaysia. The cross-sectional study is carried out using a 10 years filter and keywords such as batik AND ergonomic AND Malaysia. The searches were carried out mainly on Google scholar website but also cross-referenced with searches from Scopus. There were 371 papers when the keyword Malaysia was included, but 1,290 papers when that keyword was omitted. More than 90% of batik studies are from the Indonesian industry. Focus of the papers were on physical ergonomics, mostly associated batik workers with at least one of musculoskeletal disorders such as shoulder or back pain and CTD (although not as popular as the latter). In conclusion, more in depth study to use objective measurements are needed to validate/ verify these claims from subjective perception studies and pen & paper analyses.

Keywords: *hand-drawn batik, painting, musculoskeletal disorders, WRMSD, occupational health*

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

Mrs. Dian Darina Indah DARUIS
Department of Mechanical Engineering
Faculty of Engineering
National Defense University of Malaysia
57000 Kuala Lumpur
Malaysia
dian@upnm.edu.my





STUDY OF THE IMPACT OF QUANTITATIVE LIGHTING PARAMETERS AS A PHYSICAL AGENT TO THE HEALTH OF WORKERS DURING THE MANUFACTURING PROCESS

D. Duplakova¹, J. Duplak², Lj. Janjetović³, D. Kojić⁴

¹Technical University of Kosice, Faculty of Manufacturing Technologies with a seat in Presov, SLOVAKIA,
darina.duplakova@tuke.sk

²Technical University of Kosice, Faculty of Manufacturing Technologies with a seat in Presov, SLOVAKIA,
jan.duplak@tuke.sk

³PIM University Banja Luka, Technical Faculty, BIH, ljubica.janjetovic@gmail.com

⁴PIM University Banja Luka, Technical Faculty, BIH, kojic.d@hotmail.com

Abstract

Lighting conditions in an indoor working environment are affected by two basic attributes. The first attribute is the exterior lighting conditions, which are most often provided in the workplaces by upper or side lighting openings, and the second attribute is the constructional and architectural solution of the workplace. The basis for the correct assessment of lighting conditions in the workplace is the implementation of quantitative and qualitative analyzes of lighting components. The presented article is devoted to the assessment of lighting conditions within a specific production process in the working environment of the production hall. The introductory part of the article provides a theoretical overview of the issues with the determination of regulations and mathematical expressions that are necessary for the analysis and processing of the obtained data. The main part of the article is devoted to the description of input conditions for the implementation of in situ measurements, presentation of the obtained data, their analysis and evaluation. In the performed experiment, 820 values were collected from measurements in two series, while sampling was determined in the range of 5 seconds. Data analysis was focused on assessing light intensity, uniformity, direction error of luxmeter, and standard deviation. For the determination of the resulting values and the subsequent determination of specific rationalization measures, the average value was determined due to the possibility of comparison with regulatory regulations and standards. The conclusion of the article summarizes the results of the research and provides an overview of specific rationalization measures. This article was supported by research grants VEGA 1/0431/21 and KEGA 018TUKE-4/2021.

Keywords: working conditions, lighting analysis, measurement, production process

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

Mrs. Darina Duplakova
Department of Automobile and Manufacturing Technologies
Faculty of Manufacturing Technologies with a seat in Presov
Technical University of Kosice
Bayerova 1
080 01, Presov
Slovakia
darina.duplakova@tuke.sk





FUTURE RELEVANCE OF IDENTIFIED ORGANIZATIONAL MEASURES FOR COPING WITH THE COVID-19 PANDEMIC: A DELPHI STUDY

C. Adam¹, K. Bengler¹, S. Berger², C. Brandl³, B. Emmermann¹, M. Hajdari³,
V. Nitsch³, G. Ott², S. Pütz³, M. Schmauder²

¹Chair of Ergonomics, Technical University of Munich, GERMANY,
{caroline.adam, bengler, birte.emmermann}@tum.de

²Chair of Labour Engineering, Technische Universität Dresden, GERMANY,
{sophie.berger, gritt.ott, martin.schmauder}@tu-dresden.de

³Chair and Institute of Industrial Engineering and Ergonomics, RWTH Aachen University, GERMANY,
{c.brandl, m.hajdari, v.nitsch, s.puetz}@iaw.rwth-aachen.de

Abstract

The COVID-19 pandemic engendered massive restrictions in all areas of our social and work lives. Companies and organizations have had to make extensive adjustments to their working conditions and processes. Fifty-two interviews at 33 companies and organizations were conducted to gain insights to help companies and organizations to cope with the pandemic. The applicability and future relevance of these findings were ascertained in a practice-oriented and systematic manner in a Delphi study. For this purpose, 17 statements were formulated, which were evaluated by 21 experts from different areas based on their suitability for coping with the COVID-19 pandemic as well as their suitability for working outside a crisis situation. The assessment dimensions considered included general usefulness and company-specific relevance. The results show that not all of measures introduced in response to the pandemic can be transferred on a one-to-one basis to a period of time outside a crisis situation. Based on the results, however, it can be assumed that the COVID-19 pandemic has triggered a long-term change process in companies and organizations and that some of the measures introduced in the short term can also contribute to increasing value creation and improving working conditions in the future.

Keywords: COVID-19, pandemic, Delphi-study, measures, change process

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

Ms. Birte Emmermann
Chair of Ergonomics
Technical University of Munich
Boltzmannstraße 15
85748, Garching
Germany
birte.emmermann@tum.de





QUALITATIVE ASSESSMENT OF THE OCCUPATIONAL HEALTH AND SAFETY KNOWLEDGE MANAGEMENT PRACTICES OF HUNGARIAN COMPANIES

F. Faragó¹, G. Szabó²

¹Óbuda University, HUNGARY, farago.ferenc@uni-obuda.hu

²Óbuda University, HUNGARY, szabo.gyula@bgk.uni-obuda.hu

Abstract

In light of the accident indicators, the necessary and appropriate knowledge is questionable, as is the efficiency of knowledge sharing and knowledge management related to occupational health and safety. This research aims to examine the adequacy of occupational health and safety knowledge and the factors influencing the effectiveness of occupational health and safety education. We explore the typical problems of knowledge sharing and the gaps in the knowledge management of companies related to occupational health and safety. Based on in-depth expert interviews, we examined occupational safety knowledge management of medium-sized and large companies at a micro level among Hungarian occupational safety specialists and managers. We used the grounded theory method to analyze the interviews. The research pointed out that knowledge as such is a determining but not sufficient factor in companies' occupational health and safety performance. However, applying knowledge determines success, and the corporate culture encourages it. Based on the results of our study, we created a theoretical model of effective occupational health and safety knowledge management. The limitations of our study are the small sample size and the fact that the research only covered Hungarian companies. We propose further research to validate the model and to find a possibility to measure employees' occupational safety knowledge.

Keywords: occupational health and safety, knowledge management, value creation, business success factors, OHS performance

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

Mr. Ferenc Faragó
Doctoral School on Safety and Security Sciences
Óbuda University
Bécsi út 96/b
1034, Budapest
Hungary
farago.ferenc@uni-obuda.hu





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





THE USEFULNESS OF EYE-TRACKING GLASSES IN THE TECHNOLOGICAL UPGRADE OF THE MANUAL WORKPLACE – AN ERGONOMIC ASPECT

T. Cvahte Ojsteršek¹, B. Gajšek²

¹Faculty of Logistics, University of Maribor, SLOVENIA, tina.cvahte@um.si

¹Faculty of Logistics, University of Maribor, SLOVENIA, brigita.gajsek@um.si

Abstract

Manual processing of complex metal surfaces was chosen as an example of ergonomically less human-friendly work and demanding to automate. Work is diverse, and the processing surfaces are unique. Ergonomic work assessments are rarely used in such work environments, although all legal requirements for safe work are met. Technological excellence in engineering, flexible machining centers, and vertical integration from design to computer-controlled machines dominate ubiquitous automation and workplace modernization. This article presents a pilot technological upgrade of manual processing of design-demanding surfaces in terms of handing over part of the processing to a collaborative robot. Besides OWAS and REBA ergonomic risk assessment methods, eye-tracking glasses were used to explore their potential for assessing work ergonomics. Eye-tracking records a person's eye movement to better understand a person's visual perception. It is a low-cost and highly accurate system. Eye-tracking is used in many applications but is almost absent in production processes.

Keywords: *eye-tracking, ergonomic assessment, production process, collaborative robot*

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

Mrs. Brigita Gajšek
Faculty of logistics
University of Maribor
Mariborska 7
3000, Celje
Slovenia
brigita.gajsek@um.si





INFLUENCE OF TRAIN ROUTE SETTING FUNCTIONS AUTOMATION ON RAILWAY TRAFFIC EFFICIENCY

H. Haramina¹, I Toš², F. Batrla³

¹University of Zagreb, Faculty of Transport and Traffic Sciences, CROATIA, hharamina@fpz.hr

²University of Zagreb, Faculty of Transport and Traffic Sciences, CROATIA, ivatos92@gmail.com

³University of Zagreb, Faculty of Transport and Traffic Sciences, CROATIA, franjo.batrla@gmail.com

Abstract

The paper analyzes the impact of train route setting individual functions automation on the efficiency of railway traffic. The research was conducted on the railway infrastructure equipped with the Croatian national train control system and different versions of station interlocking systems regarding their degree of automation. The results of the research prove that automation of certain process functions due to reduce of human errors and significant acceleration of train and traffic control process can improve railway infrastructure capacity, quality of timetable realization and railway traffic safety.

Keywords: *railway automation, human factors, railway efficiency, traffic safety*

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

Mr. Hrvoje Haramina
Department of Railway Transport
University of Zagreb
Vukelićeva 4
10000, Zagreb
Croatia
hharamina@fpz.hr





REGIONAL DIFFERENCES AND BODY MASS INDEX FOR POPULATION OF CROATIAN BOYS

R. Hrženjak¹, K. Doležal²

¹University of Zagreb, Faculty of Textile Technology, CROATIA, renata.hrzenjak@ttf.hr

²University of Zagreb, Faculty of Textile Technology, CROATIA, ksenija.dolezal@ttf.unizg.hr

Abstract

The World Health Organization has published results according to which 340 million children were obese in 2016, of which 19% were boys aged 5-19. Obesity is more prevalent among children than among adolescents. Research conducted in the Republic of Croatia indicates an increasing problem of obesity in the Croatian population. As childhood obesity can result in adult obesity and cause a variety of health problems such as cardiovascular disease, it is important to take care of diet and weight from an early age.

The paper presents the results of specific body differences of boys aged 6 to 12 years (BMI, body height, chest, waist and hip girth) in 5 Croatian regions (Goransko-primorska, Slavonia, Central Croatia, Dalmatia and City of Zagreb). In doing so, it was concluded that there are differences in the body structure of boys between regions. The biggest regional differences in girths were observed in the Goransko-primorska region, in 10 and 11-year-olds.

Keywords: obesity, body mass index, regional differences, boys

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

Mrs. Renata Hrženjak
Department of Clothing Technology
University of Zagreb Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000, Zagreb
Croatia
renata.hrzenjak@ttf.unizg.hr





COMPARISON OF VARIOUS NON-DRIVING RELATED TASK CONDITIONS ON THE TAKE-OVER PERFORMANCE IN THE CONDITIONALLY AUTOMATED DRIVING

J. Jeong¹, S. Kim¹, D. Kim², S. Jin¹

¹Pusan National University, Republic of KOREA, sangeunjin@pusan.ac.kr

²Dongseo University, Republic of KOREA, dmkim@dongseo.ac.kr

Abstract

This study aimed to compare all feasible non-driving related task (NDRT) conditions on the human modality in conditionally automated driving. Ten participants were asked to drive for five different NDRT conditions (Hand Off, Mind Off, Hand/Mind Off, Eyes/Mind Off, Eyes/Hands/Mind Off) in conditionally automated driving. Various NDRTs were performed during the automated driving, and after a take-over request (TOR) occurred, manual driving must be started within a limited time. The driving data were measured in the driving simulator, and the gaze movement was measured from the eye tracker. Results showed the effects of changes in the take-over reaction time (TOR_T), Gaze reaction time (GRT), and Horizontal gaze dispersion (HGD). But the Time to change the lane (TCL) was not significant effect on conditions. First, under Eyes On conditions, results showed significantly faster TOR_T and GRT but no significant effect on TCL. Second, the Hands-On conditions did not have a statistically significant effect. Third, the Mind Off conditions also do not show the significant changes in take-over responses. Through a comparison with various combinations of human modalities: Eye, Hand, and Mind, it was confirmed that all the driver's responses were slowed in the Eyes Off condition. The implementation of NDRT during automated driving should be designed to a level that allows relatively non-hazardous tasks of Hands-Off and Minds Off.

Keywords: driving performance, take-over request (TOR), eye tracking, conditionally automated driving, human-machine interaction (HMI)

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

Mr. Sangeun Jin
Department of Industrial Engineering
Pusan National University
2, Busandaehak-ro 63, Geumjeong-gu
46241, Busan
Republic of Korea
sangeunjin@pusan.ac.kr





PRESSURE DISTRIBUTION WHEN SITTING ON A HARD SURFACE WITHOUT CUSHIONING – A CASE STUDY

M. Čeradar¹, T. Jurčević Lulić¹, J. Leder Horina², D. Domljan³

¹University of Zagreb, Faculty of Mechanical Engineering, CROATIA, mc217709@stud.fsb.hr, tjurcev@fsb.hr

²University North, CROATIA, jlederhorina@unin.hr

³University of Zagreb, Faculty of Forestry and Wood Technology, CROATIA, ddomljan@sumfak.hr

Abstract

Today's children and young people spend most of their time sitting. Also, a large part of that time refers to the time spent in an educational institution, where the furniture is not adapted to the anthropometric and physiological characteristics of pupils and students, meaning it is only suitable for a very small number of them. When sitting, most pupils and students find the sitting surface too high or too low. From a biomechanical point of view, one of the indicators of comfort when sitting is the distribution of pressure on the contact surface of the seat. Since chairs in educational institutions generally do not have a cushioned seating surface, in this study an investigation was carried out on the distribution of contact pressures on a hard, uncushioned sitting surface in different ways of sitting (different angles of torso inclination forward and backward, crossed legs) and different heights of the sitting surface ($h_s = 28$ cm, 47 cm, 68 cm). The measurement was performed on one subject - a 23-year-old student ($h = 178$ cm, $G = 685$ N). For the sake of comparability, the results are expressed as percentage values in relation to the results obtained when sitting at a suitable height of the chair with an upright torso, which are marked with 100%. The distribution of pressures and sizes of contact surfaces are shown and explained. Asymmetry of the left and right side of the body was observed. Future research will be conducted on a significant sample of male and female subjects.

Keywords: *sitting, uncushioned seating, body posture, pressure distribution*

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

Mrs. Tanja Jurčević Lulić
Faculty of Mechanical Engineering and Naval Architecture
University of Zagreb
Ivana Lučića 5
10000, Zagreb
Croatia
tjurcev@fsb.hr





MENTAL LOAD OF OFFICE WORKERS IN VARIOUS ACOUSTIC CONDITIONS

J. Kamińska¹, Ł. Kapica², J. Radosz³

¹CIOP-PIB, POLAND, jozab@ciop.pl

²CIOP-PIB, POLAND, lukap@ciop.pl

³CIOP-PIB, POLAND, jarad@ciop.pl

Abstract

The noise in the office working environment is one of the factors that can negatively affect workers' ability to concentrate, cognitive abilities, number of errors made, productivity and comfort. The aim of the study was to determine the effects of acoustic conditions in the office working environment on psychosocial load. The presented results refer to the subjective assessment (made by a group of 39 people aged 20 to 34) of work performed in various acoustic conditions (variant W1 – no presentation of acoustic stimuli, variant W2 – sounds from the office equipment, variant W3 – sounds of the office equipment with quiet conversation, variant W4 – sounds of the office equipment with loud conversation, variant W5 – filtered pink noise). The results indicate a statistically significant greater distraction (in the W3 variant) and fatigue (in the W3, W4 and W5 variants) assessed according to the Grandjean's Scale. The data obtained using the NASA-TLX questionnaire indicate that the subjects rated highly psychosocial load, strong time pressure and work-related effort. However, these results were not statistically significantly different between the study variants.

Keywords: *mental load, acoustic conditions, office work*

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

Mrs. Joanna Kamińska
Department of Ergonomics
Central Institute for Labour Protection – National Research Institute
Czerniakowska 16
00-701, Warszawa
Poland
jozab@ciop.pl





PSYCHOSOCIAL FACTORS AS PREDICTORS OF WORK ABILITY AMONG POLISH WORKERS

L. Kapica¹, L. Baka², A. Najmiec³

¹Department of Ergonomics, Central Institute for Labour Protection—National Research Institute, POLAND,
lukap@ciop.pl

²Department of Ergonomics, Central Institute for Labour Protection—National Research Institute, POLAND,
lubak@ciop.pl

³Department of Ergonomics, Central Institute for Labour Protection—National Research Institute, POLAND,
annaj@ciop.pl

Abstract

Work Ability refers to how well the workers can perform their work and be defined as a balance between the employee's ability to perform work and the demands posed by work. It is believed that Work Ability is shaped by different groups of factors, such as competence, health, and the working environment. The present study aimed to assess the relationship between psychosocial working conditions and Work Ability.

Work ability was measured with the Work Ability Index. Psychosocial working conditions were measured with the COPSOQ II subscales, in the Polish version.

The sample study includes 1510 Polish employees. The participants worked in three professions: bus drivers (n = 500), production workers (n = 506) and nurses (n = 504). The analyzed group consisted of 702 women and 808 men. The participants are in the 20-65 age range (mean = 42,72). Data were collected in a cross-sectional study. Regression analysis showed a negative correlation between quantitative demands and the work-family conflict with Work Ability. Psychological stress turned out to be the mediating variable in this relationship. The relationship between cognitive demands and Work Ability has not been demonstrated. Moreover, social support and possibilities for development were positively related to Work Ability. The indicated relationships occurred in all three professional groups. However, only in the group of production workers, the ability to work was also associated with an influence at work.

These research results shed more light on the nature of the link between psychosocial factors and Work Ability.

Keywords: *stress, job demands, WAI, psychosocial working conditions, work ability*

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

Mr. Lukasz Kapica
Department of Ergonomics
Central Institute for Labour Protection—National Research Institute
Czerniakowska 16
00-701, Warsaw
Poland
lukap@ciop.pl





THE FORMULATION FOR HUMAN FINGER-MACHINE CONTACT INTERACTION CONSIDERING NONLINEAR FLEXIBILITY AND NON-SMOOTHNESS SLIPPING BY MULTIBODY DYNAMICS APPROACH

Y. Kitazawa¹, Y. Sugawara², M. Takeda³

¹Aoyama Gakuin University, JAPAN, d5622008@aoyama.jp

²Aoyama Gakuin University, JAPAN, sugawara@me.aoyama.ac.jp

³Aoyama Gakuin University, JAPAN, takeda@me.aoyama.ac.jp

Abstract

In recent years, the opportunities for robot or machine to touch people directly are increasing in the field of nursing and rehabilitation. In such a field, it is very important to operate machines so that the person being assisted can feel at ease in the contact between the person and machine, such as gripping a person by a robot. In addition, in production factories, agriculture, vehicle driving, etc., there is an innovation to replace the work that humans have done so far with machines and automate it. In order not to deteriorate the quality of work in such automated operation, mathematical model is necessary to implement the movements that humans have performed into the characteristics and control of machines. The purpose of this study is to formulate interaction between the human finger and the machine. The human finger is a human-specific and human-like element that is dexterous and have very wide power range. The characteristics of human fingers have been measured experimentally in past studies, but they have not been formulated in consideration of the nonlinear flexibility of the finger and the non-smoothness of contact phenomena in which the friction and slip areas at the contact points change from moment to moment. In this research, we propose the formulation of a finger-machine contact model considering nonlinear flexibility and non-smoothness using the concept of multibody dynamics and analyze the behavior including gripping motion.

Keywords: *multibody dynamics, gripping, human-machine contact, nonlinear flexibility, non-smooth slipping*

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

Yuki KITAZAWA
Mechanical systems control laboratory
Aoyama Gakuin University
5-10-1 Fuchinobe, Chuo-ku, Sagamihara-shi, Kanagawa
252-5258, Kanagawa
Japan
d5622008@aoyama.jp





USING EYE-TRACKING DATA TO INVESTIGATE THE NOTICEABILITY OF SAFETY PICTOGRAM ON TRANSPARENT PACKAGING

D. Kovačević¹, M. Brozović², D. Mustić³

¹ Faculty of Graphic Arts, University of Zagreb, CROATIA, dorotea.kovacevic@grf.hr

² Faculty of Graphic Arts, University of Zagreb, CROATIA, maja.brozovic@grf.hr

³ Faculty of Graphic Arts, University of Zagreb, CROATIA, daria.mustic@grf.hr

Abstract

The aim of the study was to investigate the influence of packaging transparency on visual attention directed towards information printed on the packaging surface. In order to get objective measures of participants' attention, their eye-movements were recorded by eye-tracking technology and eye-fixation data for each visual element were analyzed. Given that visual signs play an important role in effective warning communication via product packaging, the study was mainly focused on the noticeability of the safety pictogram. The results showed that the packaging transparency did not influence the noticeability of the safety pictogram, but had a negative effect on the perception of less prominent information, such as text displayed in small type. Additionally, the experimental manipulation of the pictogram's thickness demonstrated a significant effect of pictogram visual appearance on attention capture. Taken together, the findings suggest that the noticeability of the small textual information is more sensitive to surface transparency than the pictorial information, and that thin safety pictograms capture more visual attention than the thick ones. Implications for an effective information presentation on transparent packaging were discussed.

Keywords: *eye-tracking, packaging, safety, pictogram, transparency*

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

Mrs. Dorotea Kovačević
Faculty of Graphic Arts
University of Zagreb
Getaldićeva 2
10000, Zagreb
Croatia
dorotea.kovacevic@grf.hr





ERGONOMICS IN UKRAINE

E. Lavrov

Sumy State University, UKRAINE, prof_lavrov@mail.ru

Abstract

The article analyzes the development of ergonomics in Ukraine. The history of the origin of ergonomics is shown, starting from the Soviet Union, the continuity of the stages of development of ergonomics, starting with Professor Vladimir Bekhterev, is shown. The current state of the sciences that study the human factor is analyzed. The achievements of the scientific schools of professors Anatoly Gubinsky, Vladimir Evgrafov, Akiva Asherov, Vladimir Voinenko, Alexander Rotstein, Pavel Chabanenko, Eduard Gavrilov, Viktor Doli, Alexander Burov and other scientists are analyzed and described. The contribution of Ukrainian scientists to the theory of mathematical description of human-machine interaction, the methodology for assessing and optimizing the reliability of the operator, and the theory of automation of ergonomic studies are analyzed. Achievements in the field of ergonomics of information technologies, ergonomics of automated production control systems, ergonomics of transport systems (automobile, railway), ergonomics of e-learning are characterized. The characteristics of studies devoted to the automation of calculations and the construction of decision support systems are given. The state of the introduction of scientific achievements into university disciplines devoted to the study of the “human factor” is described. The prospects for research are described and tasks for the development of ergonomic research are set.

Keywords: operator, man-machine system, reliability, simulation, ergonomics, human factor, working conditions

Address of the co-author who will also be the presenter at the Conference:

Mr. Evgeniy Lavrov
Department of Computer Science
Sumy state university
R Korsakova,2
40000, Sumy
Ukraine
prof_lavrov@mail.ru





DECISION SUPPORT FOR SOLVING PROBLEMS OF ERGONOMIC PROVISION OF CONTACT CENTERS

E. Lavrov¹, O. Siryk²

¹Sumy State University, UKRAINE, prof_lavrov@mail.ru

²Taras Shevchenko National University, UKRAINE, lavrova_olia@ukr.net

Abstract

The article analyzes the problems of ensuring the ergonomic quality of contact centers. An increase in the problems of contact centers associated with the “human factor” is shown. An increase in the intensity of the operators' activity is analyzed, an increase in the cost of errors is shown. The tasks of ergonomic support for contact centers are identified: determining the degree of automation (optimal distribution of functions between a person and a robot), determining the optimal number of operators and their qualifications, designing information models (interfaces), designing algorithms for operators' activities, distributing functions between operators, designing working conditions, ergonomic expertise, etc. The expediency of introducing support systems for ergonomic solutions in contact centers is substantiated. The structure of automated decision support systems for ergonomic support of contact centers is proposed. Mathematical models have been developed for solving the main problems of contact center ergonomics. The basis for the construction of mathematical models is the principles of models built on the basis of the functional networks of Professor Anatoly Gubinsky. Examples of solving problems of ergonomic support are given. The prospects for the development of human-friendly contact centers are described.

Keywords: *decision support system, contact-center, human factor, reliability, simulation, ergonomics, working conditions*

Address of the co-author who will also be the presenter at the Conference:

Mr. Evgeniy Lavrov
Department of Computer Science
Sumy state university
R Korsakova,2
40000, Sumy
Ukraine
prof_lavrov@mail.ru





RECOMMENDATIONS FOR AN INNOVATIVE DISTANCE CONTINUING EDUCATION DEVICE INTENDED FOR ORTHODONTIC PRACTITIONERS

A. Mailloux¹, J. Dinet²

¹Reims Maisons Blanche Hospital- orthodontics department, FRANCE, aurelie.mailloux@univ-reims.fr

²University of Lorraine, CNRS, INRIA, Loria, FRANCE, jerome.dinet@univ-lorraine.fr

Abstract

The purpose of this research user-centred is to produce design recommendations for creating an innovative distance continuing education environment dedicated to orthodontic practitioners. Before the COVID crisis, the continuous training offer were reduced to face-to-face congresses. And since the COVID crisis, behaviors and needs of orthodontic practitioners have changed and are related to (i) cancellation of all the continuing education events and (ii) emergence of numerous videoconferences, but without prior identification of practitioners' needs. To produce design recommendations for creating a useful, usable, and acceptable digital education environment for orthodontic practitioners, three techniques have been used: (1) an extensive state-of-the-art was used to better understand the recent changes in training and education related to orthodontic domain; (2) different focus groups were conducted with orthodontic practitioners to identify their real behaviors related to training and education, their needs and expectations; (3) an online questionnaire were addressed to collect a large amount of data about attitudes towards education and different online environment from future practitioners.

On the basis of the combination of the three techniques (state-of-the-art, focus group, and questionnaire), several recommendations for designers of online distance environment in term of interactions, contents, website architecture and ergonomic criteria have been produced. Moreover, from a theoretical point of view, this study has underlined the crucial role of community of practice, especially about the modality of interaction between peers and the scientific validity of the content transmitted.

Keywords: *community of practice, psycho-ergonomic study, innovative device, orthodontics, continuing training*

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

Mrs. Aurélie Mailloux
Department of Orthodontics
University of Odontology
2 General Koenig Street
51100, Reims
France
aurelie.mailloux@univ-reims.fr





INNOVATIVE TRAINING NETWORKS FOR INTERACTIVE E- LEARNING OF THE COGNITIVE ERGONOMICS OF THE REMOTE E-MULTIDISCIPLINARY TEAM BOARD IN BREAST CANCER, ENHANCED BY AI AND BIG DATA ANALYTICS FOR DECISION MAKING AND TREATMENT

C. S. Mamas¹, A. S. Mamma²

¹Program of Excellence 2014-16, HELLAS, csmmmas@med.uoa.gr

²Program of Excellence 2014-16, HELLAS, adamadia.mamma.1@gmail.com

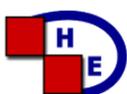
Abstract

Background and purpose: The project refers to the effect that interactive E-Learning among experts participants in our innovative Remote E-Multidisciplinary Board for Breast Cancer (PROMETHEUS II pn:1009078, 34931,34932,34933) is being integrated with the Hellenic Hyper-computer ARIS for Big Data analytics and computing. Design/methodology/Results: Integrated analysis of two research projects results showed that the E-Multidisciplinary Board in Breast Cancer may also be the substance of Innovative Networks for Interactive Collaborative E-Learning and Training among experts, residents and students for further and deep learning of the cognitive ergonomics of the E-Multidisciplinary Board incorporating AI and Big Data Analytics and Computing to optimize quality in Breast Cancer decision making, management and treatment in the peripheries. Conclusions.: Ergonomics of Innovating Training Networks for Interactive E-Learning in the context of the E-Multidisciplinary Board in Breast cancer decision support and making, management and treatment in combination with the Mobile Clinical Unit "Macedonia" for Breast Cancer prevention may be instructed remotely and interactively, while integration with AI and Big Data analytics interactive E-Learning may teach cognitive ergonomics of the E-Multidisciplinary Board and sustain an efficient surveillance system on a European Level and in the Balkans to optimize quality in Breast Cancer Screening, Prevention, Treatment and Survivorship especially for the peripheries.

Keywords: *cognitive ergonomics, e-learning and training, AI and big data analytics and computing, breast cancer*

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

Mr. Constantinos S. Mamas
Department of Surgery GHK
National and Kapodistrian University of Athens-Program of Excellence 2014-16
Kononos 9
Pagrati-Athens
Hellas
csmmmas@med.uoa.gr





INTERACTIVE E-LEARNING AND E-TRAINING ENHANCED BY AI AND BIG DATA ANALYTICS OF COGNITIVE ERGONOMICS OF THE REMOTE E-MULTIDISCIPLINARY BOARD IN LIVER CANCER

C. S. Mammas¹, A. S. Mamma²

¹Program of Excellence 2014-16, HELLAS, csmammas@med.uoa.gr

²Program of Excellence 2014-16, HELLAS, adamadia.mamma.1@gmail.com

Abstract

Background and purpose: The project refers to the effect that interactive E-Learning among expert participants in our innovative Remote E-Multidisciplinary Board for Liver Cancer (PROMETHEUS II pn:1009078) is being integrated with the Hellenic Hyper-computer ARIS for Big Data analytics and computing. Design/methodology/Results: Integrated analysis of three research projects results showed that the E-Multidisciplinary Board in Liver Cancer may also be the substance of Innovative Networks for Interactive Collaborative E-Learning and Training incorporating AI and Big Data Analytics and Computing among experts, residents and students for further and deep learning of the cognitive ergonomics of the E-Multidisciplinary Board to optimize quality in Liver Cancer decision making, management and treatment in the peripheries. Conclusions: Ergonomics of Innovating Training Networks for Interactive E-Learning for remote evaluation of the patients suffering from Liver Cancer in the context of the E-Multidisciplinary Board in cancer decision support and making, management and treatment in combination to the Mobile Clinical Unit "Macedonia" for Liver Cancer prevention may be instructed remotely and interactively, while integration with AI and Big Data analytics interactive E-Learning may teach cognitive ergonomics of the E-Multidisciplinary Board and sustain an efficient surveillance system on a European Level and in the Balkans to optimize quality in Liver Cancer Screening, Prevention, Treatment and Survivorship especially for the peripheries.

Keywords: *cognitive ergonomics, e-learning and training, AI and big data analytics and computing, liver cancer*

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

Mr. Constantinos S. Mammas
Department of Surgery GHK
National and Kapodistrian University of Athens-Program of Excellence 2014-16
Kononos 9
Pagrati-Athens
Hellas
csmammas@med.uoa.gr





TRANSPORTATION PREFERENCES AND RISKS PERCEPTION DURING THE COVID-19 ERA

H. Marciano¹, G. Luria², N. Cohen-Moravia³

¹Institute of Information Processing and Decision Making (IIPDM), Ergonomics & Human Factors Unit,
University of Haifa, ISRAEL, and Psychology Department, Tel-Hai College, ISRAEL,
hmarcial1@univ.haifa.ac.il

²Social Welfare and Health Sciences, Department of Human Services, University of Haifa, ISRAEL,
gluria@univ.haifa.ac.il

³Social Welfare and Health Sciences, Department of Human Services, University of Haifa, ISRAEL,
nofar2310cohen@gmail.com

Abstract

Based on the theory of risk homeostasis (Wilde, 1982; 1988) we developed a new survey methodology. We gathered data concerning the perceptions of risks and gains with regard to different modes of transportation, during the Covid-19 pandemic in Israel (May 26th – May 30th, 2021). 940 participants, from three different metropolises, answered the questionnaire, which was distributed via an internet panel company. Results confirmed the theory's assumptions: people take into consideration many aspects when they decide on the transportation mode to take for each travel. During the Covid-19 crisis the infection risk was accounted for by travelers, but people agreed to take this infection risk after considering other interests, such as convenience, speed, price, etc. For example, people were willing to take more risks in buses compared with any other available modes of transportation, and despite the fact that buses were judged to be the less safe mode from Covid-19 perspective. This pattern was found because buses are the cheapest, most prevalent and accessible mode of transportation in the cities of Israel. We suggest that people do not want to compromise their health if they spend a lot of money for the transport. However, if the cost is lower (e.g., buses or walking), or if they feel like they have no choice from transportation perspective, they will make more compromises.

Keywords: *theory of risk homeostasis, public transportation, Covid-19*

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

Dr. Hadas Marciano
Psychology Department
Tel-Hai College, Tel Hai
1220800, Tel Hai
Israel
hmarcial1@univ.haifa.ac.il





EFFECT OF GAMING CONTROLLERS ON WRIST ANGLES

L. A. Mariano¹, I. Priadythama², P. Y. Loh³, S. Muraki⁴

¹Kyushu University, JAPAN, lamariano@up.edu.ph

²Kyushu University, JAPAN, priadythama@staff.uns.ac.id

³Kyushu University, JAPAN, py-loh@design.kyushu-u.ac.jp

⁴Kyushu University, JAPAN, muraki@design.kyushu-u.ac.jp

Abstract

The study aimed to distinguish wrist movement characteristics when playing with different controllers. Five healthy university students played an esports game with three types of controllers/devices: a keyboard and mouse, a smartphone (iPhone 12), and a PS5 DualSense controller. Participants used the three controllers to play a first-person shooter (FPS) game for five minutes each. A 3D motion capture system was used to record and analyze variations in the wrist angle. Our results suggest that participants presented the highest wrist extension angles when using a PS5 DualSense controller for the left wrist and using a mouse for the right wrist. In contrast, for the ulnar deviation angle, both the keyboard and PS5 controllers yielded the highest angles for the left wrist. The PS5 controller yielded the highest ulnar deviation angles for the right wrist among the three devices. For all controller types, a combination of wrist extension and ulnar deviation angles was predominant.

Keywords: *esports, esports ergonomics, gaming controllers, wrist angle*

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

Ms. Lizbeth A. Mariano
Department of Design, Graduate School of Design
Kyushu University
4 Chome-9-1 Shiobaru, Minami Ward
815-8540, Fukuoka City
Japan
lamariano@up.edu.ph





ASSESSMENT OF ACOUSTICAL ERGONOMICS WITHIN CESSNA CITATION CJ2 AIRCRAFT

P. K. Mikačić¹, T. Bucak²

¹Faculty of Transport and Traffic Sciences, University of Zagreb, CROATIA, mikacicpk@gmail.com

²Faculty of Transport and Traffic Sciences, University of Zagreb, CROATIA, tino.bucak@fpz.unizg.hr

Abstract

People often present questions such as “Why are the jet engines so loud?”, “Will I have hearing problems if I regularly fly in the aircraft?”, “How does the loud noise of the aircraft influence crew and passengers?”. This paper provides interior noise analysis of the light business jet Cessna Citation CJ2, with experimentally measured noise levels during normal flight operations. As human beings are the main operators of aircraft it is also important to examine how humans perceive sound and how noise affects them physiologically and psychologically. Measured noise data is presented in a tabular and graphical way, giving precise and simple insight during all segments of the flight. Lastly, the results are processed through objective metrics, yielding the actual influence of Cessna Citation CJ2 aircraft noise levels on the crew and passengers’ acoustical comfort.

Keywords: *aircraft interior noise, Cessna CJ2, human comfort, psychoacoustic ergonomics*

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

Mr. Petar Krešimir Mikačić
Dept. of Aeronautics
University of Zagreb
Vukelićeva 4
10000, Zagreb
Croatia
mikacicpk@gmail.com





ERGONOMIC DESIGN OF THE HAND SAW HANDLE

D. Milčić¹, A. Vučina², M. Bošnjak²

¹University of Zagreb, Faculty of Graphic Arts, CROATIA, dmilcic@grf.hr

²University of Mostar, Faculty of Mechanical Engineering, Computing and Electrical Engineering, BIH,
adisa.vucina@fsre.sum.ba

Abstract

In order to design the handle of a hand tool as ergonomically acceptable, it is necessary to know all aspects of the human hand and define ergonomic design guidelines. Defining requirements and technical specifications ensures the quality of ergonomic design. Following the results of current research in tool handle design, the possibility of better interaction between the tool and the user is created. The handle of the hand tool was created based on defined ergonomic guidelines in order to reduce disorders of the musculoskeletal system and increase functionality, comfort and safety. The research was conducted on the example of a hand saw handle.

Keywords: *ergonomic design, hand saw handle*

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

Mrs. Diana Milčić
University of Zagreb Faculty of Graphic Arts
Getaldićeva 2
10000, Zagreb
Croatia
dmilcic@grf.hr





THE AIR GAPS IN THE PROTECTIVE CLOTHING

M. Młynarczyk¹, J. Orysiak², J. Jankowski³

¹Central Institute for Labour Protection – National Research Institute, POLAND, m.mlynarczyk@ciop.pl

²Central Institute for Labour Protection – National Research Institute, POLAND, joanna.orysiak@ciop.pl

³Central Institute for Labour Protection – National Research Institute, POLAND, jajan@ciop.pl

Abstract

The heat exchange in the system human body - clothing - external environment depends largely on the degree of thermal insulation of the clothing used. Thermal insulation is the basic parameter describing a clothing, which includes, inter alia: thermal resistance of individual layers of clothing. It also takes into account the air gaps between garment and the body. The garment style is determined by the body shape, as well as, the vacant space between the body and the garment. Air spaces could be determined using the 3D scanning technique, which is considered as the most accurate and reproducible method for the air volume quantification under clothing. The 3D scanning technique provides also an effective way to visualize the air gaps between clothing and the body. The aim of the study is to present the methodological assumptions for measuring the air gaps under clothing and demonstrate their impact on thermal property of clothing.

This paper was published and based on the results of a research task carried out within the scope of the fifth stage of the National Programme “Improvement of safety and working conditions” supported within the scope of state services by the Ministry of Family and Social Policy. Task no. 3.SP.04 entitled “Study of the influence of clothing adaptation on thermal insulation and water vapor resistance in the clothing - heat source system”. The Central Institute for Labour Protection – National Research Institute is the Programme’s main co-ordinator.

Keywords: 3D scanning, heat exchange, thermal properties, protective clothing, air volume

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

Ph.D. Eng. Magdalena Młynarczyk
Department of Ergonomics
Central Institute for Labour Protection – National Research Institute
Czerniakowska St 16
00-701, Warsaw
Poland
m.mlynarczyk@ciop.pl





REACHABILITY SIMULATION OF CAR DASHBOARD COMMANDS: A COMPARISON BETWEEN DELMIA™ V5 AND UNREAL ENGINE™ V4

F. Adinolfi¹, V. A. Faustini¹, A. Terracciano¹, A. Yalcin¹, R. Califano¹, N. Cappetti, A. Naddeo¹
¹Dept. of Industrial Engineering, University of Salerno, Italy, anaddeo@unisa.it

Abstract

The aim of this study is to provide an example of a methodology to simulate human-machine interaction in human centric design approach for performing ergonomics and (dis)comfort analyses. It consists of gathering data from the real world, creating a virtual model of the environment and a digital human model, and finally simulating interactions with artefacts and human body-parts motions in different software applications. Firstly, motion capture has been carried out using a low-cost motion-capture system with markers and cameras, then data acquired have been processed using Python© and Matlab© codes to extract useful information about the movements. This information has been processed to recreate the movements in a virtual environment using DELMIA™ and Unreal Engine™. Both methods proved their reliability in testing reachability, but the comparison showed that Unreal Engine™ appears much more realistic in manikin and movements' simulations than DELMIA™.

Keywords: reachability, DELMIA, unreal engine, car seat, virtual environment, ergonomics, comfort

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

Mr. Alessandro Naddeo
Department of Industrial Engineering
University of Salerno (Italy)
Via Giovanni Paolo II, 132
84084, Fisciano (SA)
Italy
anaddeo@unisa.it





ERGONOMICS FOR EMPLOYEES' SATISFACTION IN LEAN MANUFACTURING SYSTEMS

N. P. Neag¹, A. Draghici², M. Boatca³

¹Politehnica University of Timisoara, ROMANIA, nicoleta.neag@student.upt.ro

²Politehnica University of Timisoara, ROMANIA, anca.draghici@upt.ro

³Politehnica University of Timisoara, ROMANIA, maria.boatca@student.upt.ro

Abstract

The human side of lean manufacturing systems is concerned with the adequate behavior for continuous improvements, high rates of productivity and waste reduction, but also, with supporting low stress and high satisfaction of the employees; ergonomics interventions could facilitate workplace wellbeing. The article aims to present a framework for assessing the ergonomics interventions using the usability concept to get feedback on employees' satisfaction related to their working conditions. The research approach uses a mix of methods and tools and has been validated in the case of an automotive wiring harness assembly line (from a multinational company): the tasks in the shop floor, the control, packaging and warehouse logistic tasks, and the managerial tasks. Results have supported the idea of ergonomics continuous improvement, using the participative approach which implies employees' deep involvement and contribution to the optimization of workflow processes (from the perspective of effective and efficient use of all categories of resource) and that could reduce waste and improve processes development and product quality.

This paper was financially supported by the Project "Network of excellence in applied research and innovation for doctoral and postdoctoral programs / InoHubDoc", project co-funded by the European Social Fund financing agreement no. POCU/993/6/13/153437.

Keywords: ergonomics, lean management, Overall Equipment Effectiveness (OEE), work task, SUS test.

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

Prof. Draghici Anca
Faculty of Management in Production and Transportation
Politehnica University of Timisoara
14 Remus Str.
300191, Timisoara
Romania
anca.draghici@upt.ro





OCCUPATIONAL SAFETY WITH ARTIFICIAL INTELLIGENCE APPLICATION FOR ERGONOMIC RISK ASSESSMENT

N. P. Neag¹, M. Boatca², A. Draghici³

¹Politehnica University of Timisoara, ROMANIA, nicoleta.neag@student.upt.ro

²Politehnica University of Timisoara, ROMANIA, maria.boatca@student.upt.ro

³Politehnica University of Timisoara, ROMANIA, anca.draghici@upt.ro

Abstract

The main interest is to build-up effective and efficient prevention programs based on OHS management, risk assessment (continuous monitor and control) and thus, to create an organizational climate work based on employees' wellbeing and productivity. Workplace risk assessment is a compulsory practice in Occupational Health and Safety (OHS) throughout Europe. However, shifting from minimum legal requirements in OHS to ergonomics involves a comprehensive approach to workplace risks and all their determinants. Due to the fast pace of technological advancements, ergonomists can leverage new software solutions based on Artificial Intelligence (AI) for workplace risks management and conception of ergonomic interventions. The article includes a review of the literature on the topic of Artificial Intelligence (AI) used in ergonomics, along with a case study on the use of AI-based software for ergonomic risks assessment in a furniture manufacturing company. The research results have proved the maturity, effectiveness and efficiency of the proposed research approach which could be quick transferred into organizations' practice.

This paper was financially supported by the Project "Network of excellence in applied research and innovation for doctoral and postdoctoral programs / InoHubDoc", project co-funded by the European Social Fund financing agreement no. POCU/993/6/13/153437.

Keywords: ergonomics, risk assessment, postural analysis, AI, occupational safety.

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

Prof. Draghici Anca
Faculty of Management in Production and Transportation
Politehnica University of Timisoara
14 Remus Str.
300191, Timisoara
Romania
anca.draghici@upt.ro





HYDRATION STATUS ASSESSMENT BASED ON BODY MASS, URINE COLOR AND THIRST IN WORKERS

J. Orysiak¹, M. Młynarczyk², P. Tomaszewski³, P. Prus⁴

¹Central Institute for Labour Protection – National Research Institute, POLAND, joanna.orysiak@ciop.pl

²Central Institute for Labour Protection – National Research Institute, POLAND, m.młynarczyk@ciop.pl

³Józef Piłsudski University of Physical Education, POLAND, pawel.tomaszewski@awf.edu.pl

⁴Central Institute for Labour Protection – National Research Institute, POLAND, piotr.prus@ciop.pl

Abstract

Dehydration, i.e. water deficit in the body, affects health, mental ability and physical performance. There are several methods for estimating body hydration status. The aim of the study was to determine the hydration status using body mass, thirst and urine color compared to serum osmolality. The study involved ten men (age 32.9 ± 6.1 years) with serum osmolality (S_{osm}) above 290 mOsmol/kg H₂O (group 1) and six men (age 33.5 ± 8.0 years) with $S_{osm} < 280$ mOsmol/kg H₂O (group 2). The study was carried out in the morning, on a fasting state. If the worker noticed a change in body mass $> 1\%$ compared to the previous day, or a change in urine color to darker or present of thirst, the volunteer was qualified as meeting at least 1 dehydration criterion (Kenefick and Sawka 2007). The mean serum osmolality were 297 ± 6 mOsmol/kg H₂O in group 1 and 277 ± 3 mOsmol/kg H₂O in group 2. Six workers in group 1 and three workers in group 2 met one criterion of dehydration. On the other hand, two dehydration criteria were observed only in two workers in group 2. In conclusion, blood indices did not correlate with other hydration status indices. This paper is published and based on the results of a research task no. IV-38 carried out within the scope of the statutory activity, financed in the years 2021-2022 from the funds of the Ministry of Science and Higher Education.

Keywords: dehydration, serum osmolality, hydration urine indices, workers

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

Dr Joanna Orysiak
Department of Ergonomics
Central Institute for Labour Protection – National Research Institute
Czerniakowska St 16
00-701, Warsaw
Poland
joanna.orysiak@ciop.pl





THE ADVANTAGES OF DIARY STUDY AS A PRODUCT FEATURES RESEARCH METHOD

J. Pibernik¹, A. Mojić², J. Dolić³, L. Mandić⁴

¹University of Zagreb, Faculty of Graphic Arts, CROATIA, jpiberni@grf.hr

²University of Zagreb, Faculty of Graphic Arts, CROATIA, alen.mojic@grf.unizg.hr

³University of Zagreb, Faculty of Graphic Arts, CROATIA, jurica.dolic@grf.hr

⁴University of Zagreb, Faculty of Graphic Arts, CROATIA, lidija.mandic@grf.hr

Abstract

This paper describes the advantages of the diary studies research method used to collect qualitative data about the user's long-term behaviors, activities, and experiences in comparison with other user research methods like interviews and surveys. The importance of choosing a particular research method in the process of developing a mobile application for diabetes is discussed. While diary studies require more time and effort to conduct than other user-research methods, they yield invaluable information about customers' real-time real-life behaviors and experiences. The paper compares data obtained from interviews with 5 respondents, a survey conducted with 427 respondents, and a diary study in which 5 respondents from a previously defined target group of users participated. The results of the log study are presented through ideas for future mobile application functions. Further analysis of qualitative and quantitative data related to frustrations, routines, and long-term behavior yielded results. Based on the confirmed hypotheses, it was concluded that the study of the diary provides a better insight into the user's behavior at the time, which has a positive impact on recognizing and defining future functions of the mobile application.

Keywords: long-term behavior, diary study, user research methods, mobile application

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

Mrs. Jesenka Pibernik
Department of graphic design and imaging
University of Zagreb, Faculty of Graphic Arts
Getaldićeva 2
10000, Zagreb
Croatia
jpiberni@grf.hr





EVACUATION PLANNING FOR HOSPITAL DEPARTMENTS – TIME ESTIMATION

J. Rauscher

Óbuda University, Doctoral School on Safety and Security Sciences, HUNGARY, judit@flamella.hu

Abstract

Hospital evacuation is a very complex system, as patients with different conditions typically have different degrees of ability to escape. The condition of patients in hospital wards is constantly changing and patients often change function, so their ability to escape is in constant flux. When an assisted escape or rescue is required, the time needed is significantly influenced by the number of assistants involved in the rescue. However, planning and practice are affected by a number of ethical and operational issues, for which the use of evacuation simulation programs can be a good solution. In this article, as a continuation of my previous checks, I sought to answer the question to what extent the condition of the patients influences the time required for evacuation from a given hospital unit. The test series showed that the evacuation time could double for 19 patients, reaching 11-12 minutes. The increase in time was to be expected, but the magnitude of the increase is significant for a relatively small number of patients. This demonstrates that the impact of the patients' condition is significant and that the correct design of the rates has a major impact on the results and thus on the level of safety in reality. The present series of tests has also demonstrated that simulation methods can be used to correctly assess a situation or condition in terms of evacuation with relative ease and, with adequate care. Similar studies can be carried out during the design phase or, in the case of existing facilities, within the decision support framework.

Keywords: hospital evacuation, evacuation simulation, Pathfinder, case study

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

Mrs. Judit Rauscher
Doctoral School on Safety and Security Sciences,
Óbuda University
H-1034, Budapest
Hungary
judit@flamella.hu





THE ERGONOMICS OF BLOOD PRESSURE MEASUREMENT

U. Reischl¹, C. Colby²

¹Boise State University, USA, ureischl@boisestate.edu

²Boise State University, USA, ccolby@boisestate.edu

Abstract

Upper arm sphygmomanometry is the most commonly used clinical method for measuring blood pressure in adults. However, variations in upper arm circumference and use of different cuff-sizes result in different pressure readings. When using the same cuff size, pressure readings will be higher for larger arm circumferences and lower for smaller arm circumferences. The objective of this study was to identify an anthropometric adjustment factor that will allow pressure readings obtained for any combination of arm circumference and cuff size to be compared. Simulations showed that sphygmomanometer pressure values for different combinations of cuff size and arm circumference can be combined using the percentage (%) of upper arm circumference covered by a sphygmomanometer cuff. Measurements on nineteen test subjects showed that a 1% change in upper arm coverage results in a 1mmHg change in both systolic and diastolic pressure readings. Applying such an anthropometric based adjustment factor will permit a patient's blood pressure to be compared to other readings obtained with different cuff bladder dimensions. Such an anthropometrically based adjustment factors will allow blood pressure readings to be standardized.

Keywords: *sphygmomanometer, cuff size, arm circumference, anthropometric adjustment factor*

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

Prof. Uwe Reischl
Department of Public Health and Population Science
Boise State University
Boise, Idaho
83725-1835
USA
ureischl@boisestate.edu





INFLUENCE OF SIMULATED OUTDOOR WEAR ON THE PERFORMANCE OF SPORTSWEAR FOR A PROFESSIONAL FOOTBALL PLAYER

S. Toktaş¹, I. Salopek Čubrić², A. Petrov³

¹Ege Üniversitesi, Mühendislik Fakültesi, TURKEY, toktassena@outlook.com

²University of Zagreb Faculty of Textile Technology, CROATIA, ivana.salopek@ttf.unizg.hr

³University of Zagreb Faculty of Textile Technology, CROATIA, antonija.petrov@ttf.unizg.hr

Abstract

The importance of sports and active sportswear has increased worldwide. Comfort, functionality, and attractive design are the main characteristics that every sportswear should fulfill. All these characteristics significantly affect the performance and efficiency of active athletes. Since undisturbed mobility is required in sports, clothing should be fully adapted to the athlete's body. Knitwear is most often used to make sportswear due to its good permeability to water vapor, elasticity, and stretchability. As a result, in recent years the demand for knitted fabrics has risen sharply. Among listed properties, a very important property of sportswear is the resistance of the material to abrasion. Abrasion resistance of textiles is a complex phenomenon, and the properties of the fibers are affected by the yarns, the fabric structure, and the finishing processes. Abrasion resistance has a direct effect on the usable properties of the product. The direct effect of abrasion under the action of mechanical friction reduces the quality of the product itself, damages it, encourages pilling, fades, etc. This study aims to investigate how simulated outdoor wear, which dominantly refers to the abrasion process, affects the properties of a series of sportswear materials intended for use by a professional football player. The simulation of wear is performed using the AquAbrasion tester. In the study, the tensile properties of a selected set of materials were tested before and after the simulation on the AquAbrasion tester. In order to observe differences between different actions of the forces, both strip and ball burst methods are used. The results of the material elongation and acting forces are further discussed and brought into the context of material properties and final use by a professional athlete.

Keywords: athlete, sportswear, wear, tensile properties, abrasion

Address of the paper's corresponding co-author:

Assoc. prof. Ivana Salopek Čubrić, PhD
Department of Textile Design and Management
University of Zagreb Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000, Zagreb
Croatia
ivana.salopek@ttf.unizg.hr





ERGONOMIC DESIGN OF THE PET BOTTLE FOR MAXIMUM USABILITY

M. Soldo, N. Rašović, A. Vučina

¹Faculty of Mechanical Engineering, Computing and Electrical Engineering, BIH, mario.soldo@fsre.sum.ba

²Faculty of Mechanical Engineering, Computing and Electrical Engineering, BIH, nebojsa.rasovic@fsre.sum.ba

³Faculty of Mechanical Engineering, Computing and Electrical Engineering, BIH, adisa.vucina@fsre.sum.ba

Abstract

The paper's primary goal is to analyse and define guidelines and methodology for the ergonomic design of PET bottles. In designing any product, in addition to production requirements (design for manufacturing), ergonomic and aesthetic requirements must be considered to provide the consumer with practicality, usability and aesthetic appeal. However, design for aesthetics is not considered, which constrained the research activities. The conclusion summarises the ergonomic design of PET bottles according to ergonomic guidelines defined in the paper.

Keywords: *design, PET bottle, ergonomics, surface modelling*

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

Mr. Mario Soldo
Faculty of Mechanical Engineering, Computing and Electrical Engineering
University of Mostar
BIH
mario.soldo@fsre.sum.ba





ERGONOMIC ASPECTS OF THE DAUGHTERS OF MARY, HELP OF CHRISTIANS', PASTORAL HABIT AND SUGGESTIONS FOR ITS IMPROVEMENT

I. Šabarić¹, F. Karin², M. Bodrožić³

¹University of Zagreb Faculty of Textile Technology, CROATIA, irena.sabarić@tff.unizg.hr

²University of Zagreb Faculty of Textile Technology, CROATIA, franka.karin@tff.unizg.hr

³University of Zagreb Faculty of Textile Technology, CROATIA, mihaela.bodrozic@gmail.com

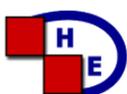
Abstract:

Nuns' clothing is a type of uniform easily recognisable as such. Each order has its own rules and a habit that indicates belonging to it. As with any type of uniform, there are certain disadvantages that make it difficult to perform daily tasks. The aim of this paper is to propose improvements for habits based on the survey conducted among the Daughters of Mary Help of Christians – Salesian Sisters of Don Bosco order. As the result, adjustments were proposed stemming from the analysed questionnaires with the aim of adapting the ergonomic aspects of the habit to the order's daily activities.

Keywords: nuns' 'habit, Salesian Sisters, uniform adaptation, ergonomics

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

Mrs. Irena Šabarić
Fashion department
University of Zagreb Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000, Zagreb
Croatia
irena.sabarić@tff.unizg.hr





THE UV PROTECTION OF CATIONIZED COTTON/POLYESTER BLEND

A. Tarbuk¹, I. Čorak¹, S. Brnada¹, T. Dekanić¹

¹University of Zagreb Faculty of Textile Technology, CROATIA, anita.tarbuk@tff.unizg.hr

Abstract

Clothing provides some UV protection which depends on the physical and chemical properties of the fiber and fabric. Cationization, as a modification with ammonium compounds in alkaline medium, results in the change of the surface charge, as well as in higher fabric thickness and lower porosity. Since these parameters contribute to better UV protection, in this research, the cotton/polyester 50/50 blended fabrics were cationized with Rewin OS by exhaustion method. An anionic optical brightener Uvitex RSB was applied in concentrations of 1, 2, 5 and 10% owf by exhaustion. The whiteness and yellowing were determined on remission spectrophotometer Spectraflash SF 300 (Datacolor) according to ISO 105-J02:1997 and DIN 6167:1980 respectively. The UV protection was determined according to AS/NZS 4399:2017 on the transmission spectrophotometer, Cary 50 Solascreen (Varian). The porosity and thickness were determined. Porosity was calculated based on the fabric cover factor after analysis of microscopic images using DinoLite microscope and the fabric thickness was performed on a thickness gauge. All parameters were observed and evaluated in correlation in relation to fabric UV protection.

Keywords: cotton/polyester blend, cationization, optical brightener, porosity, thickness, UV protection

Acknowledgement:

The work has been supported by Croatian Science Foundation under the project UIP-2017-05-8780 HPROTEX.

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

Mrs. Anita Tarbuk
Department of Textile Chemistry and Ecology
University of Zagreb Faculty of Textile Technology
Prilaz baruna Filipovića 28a
10000, Zagreb
Croatia
anita.tarbuk@tff.unizg.hr





ANALYSIS OF THE POSSIBLE IMPACT OF CABIN DISTRACTIONS ON THE PERFORMANCE OF YOUNG FEMALE ROAD VEHICLE DRIVERS

S. Tokić¹, D. Sumpor¹, M. Zelenika Zeba², S. Đuranović¹

¹ University of Zagreb, Faculty of Transport and Traffic Sciences, CROATIA, stokic@fpz.unizg.hr

² Polyclinic for Rehabilitation of Listening and Speech SUVAG, CROATIA,

² University of Zagreb, Faculty of Electrical Engineering and Computing, CROATIA

Abstract

In this second preliminary study, the possible impact of cabin distractions on the performance of young female road vehicle drivers was analyzed. Six female drivers under the age of 30 were filmed with GoPro cameras while driving. The potential negative impact on the performance of female drivers was analyzed using the method of analyzing the glance behavior of female drivers. Female drivers performed two driving segments; baseline and driving under the usual cabin distractions while keeping the road sections and external conditions on the road consistent for each driving segment and each type of cabin distraction. The driving segment under the cabin distractions included smoking while driving, consuming soft drinks from a PVC bottle, and using a mobile phone. A mobile phone was fixed on a rack under the central rear-view mirror and used for two types of cabin distractions: talking using a video link and solving the cognitive task set through a video link conversation. The performance of drivers exposed to cabin distractions was compared with the performance in baseline driving mode, both using the most important measures of the method of analyzing the gaze parameters of female drivers: the percentage of gaze in individual zones, the duration of each gaze by zones, the number of transitions between zones, and the number of zones in which the drivers looked. The results of this preliminary study will be used to design a final larger research blueprint on a larger sample of drivers with adequate gender - age representation.

Keywords: cabin distractions, female subjects, performance, glance,

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

Mr. Sandro Tokić
Chair of Fundamental Courses
University of Zagreb Faculty of Transport and Traffic Sciences
Vukelićeva 4
10000, Zagreb
Croatia
stokic@fpz.unizg.hr





”NEUROT AFL” SOFTWARE AND HARDWARE SYSTEM FOR INCLUSIVE EDUCATION

A. Smolin¹, J. Didevich², A. Dzhumagulova³, A. Balkanski⁴,
A. Spiridonova⁵, L. Sopronenko⁶, Y. Magina⁷, A. Volosiuk⁷

^{1,3,4,5,6}ITMO University, Saint-Petersburg, RUSSIA, smolin@itmo.ru

²Self-employed

⁷K. K. Grot boarding school №1, Saint-Petersburg, RUSSIA, aavolosiuk@gmail.com

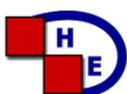
Abstract

This article is devoted to research in the field of using information technology for individual and group work of blind and visually impaired children, including those with intellectual disabilities. As a part of this research a unique hardware-software complex "Neurotafl" was developed. The correctional-pedagogical experiment was carried out, as well as the study of anxiety in children 7-12 years old.

Keywords: *information technology, neurointerface, blind, visually impaired, intellectual disability, anxiety, haptics, accessibility, accessible interface, multimodal perception*

Address of the paper's corresponding co-author:

Aleksandr Volosiuk
K. K. Grot boarding school №1
Saint-Petersburg
Russia
aavolosiuk@gmail.com





VIRTUAL REALITY APPLICATION IN MAXILLOFACIAL AND PLASTIC SURGERY

N. Tulikov¹, A. Smolin², D. Shtennikov³, A. Lysenko⁴, E. Ivanova⁵, I. Klimov⁶,
A. Mironov⁷, A. Volosiuk⁸

¹Self-employed

^{2,3,6,7,8}ITMO University, smolin@itmo.ru

^{4,5}First Pavlov State Medical University, RUSSIA

⁸St. Petersburg Electrotechnical University, RUSSIA, aavolosiuk@gmail.com

Abstract

The article describes a joint study of the Center for Usability and Mixed Reality (ITMO University) and the Department of Maxillofacial and Plastic Surgery (First Pavlov State Medical University) on applying Virtual Reality and Neurotechnology in medicine. The authors designed a VR application simulating the operating room at the Department of Maxillofacial and Plastic Surgery, to be used for the preoperative preparation of patients. The VR application was then tested in an experiment comparing the physiological parameters of two groups of patients - those who used the application and those who did not. The experiment results demonstrated the high efficiency of applying VR technologies in the preoperative preparation of patients.

Keywords: virtual reality, medicine, 3D modeling, neurotechnology, surgery

Address of the paper's corresponding co-author:

Aleksandr Volosiuk
St. Petersburg Electrotechnical University
Saint-Petersburg
Russia
aavolosiuk@gmail.com





ONLINE APPLICATION FOR FAST PURE TONE AUDIOMETRY IN NON-LABORATORY CONDITIONS

J. Vujević¹, K. Jambrošić²

¹University of Zagreb Faculty of Electrical Engineering and Computing, CROATIA, josipa.vujevic@fer.hr

²University of Zagreb Faculty of Electrical Engineering and Computing, CROATIA, kristian.jambrosic@fer.hr

Abstract

Hearing is very important for various professions, such as pilots and drivers, musicians, emergency services, etc. However, sometimes it is difficult to regularly monitor hearing health with audiological examinations due to time or financial limitations. The same is true for psychoacoustic scientific tests, where it is important to have information about the hearing health of the subjects. The importance of adapting the sound reproduction system to the individual hearing sensitivity is recognized by many smartphone manufacturers who offer the option of testing the user's hearing and adapting the sound reproduction using headphones to individual hearing. For the above reasons, an online hearing test application for pure tone audiometry was designed with the main goal to be accessible by any user with quality headphones in a quiet place, not just from a dedicated laboratory. The need for headphone calibration and equalization is further discussed. For precise results the system requires calibration of subject headphones, but it is important to notice that the presented and similar other audiometry applications can be used for early detection of hearing impairment if hearing is monitored at certain intervals, even if non-clinical or even non-calibrated system is used.

Keywords: pure tone audiometry, hearing monitoring, hearing impairment, headphone calibration

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

Mrs. Josipa Vujević
Department of Electroacoustics
Faculty of Electrical Engineering and Computing
University of Zagreb
Unska 3
10000, Zagreb
Croatia
josipa.vujevic@fer.hr



Report on Humanitarian action for the earthquake-affected areas in the Republic of Croatia

In the wake of a devastating earthquake that affected Croatia on 29 December 2020, the humanitarian action of the Croatian Ergonomics Society for the earthquake-affected areas in the Republic of Croatia (31.12.2020 - 27.03.2021) which was started by the decision of the Executive Board of the Croatian Ergonomics Society dated 31.12.2020. was finally successfully completed on 27.3.2021. when the recipient of the donation, Štefan Rožanković from Greda, Greda195, Sisak and his family (a small child of 20 months with two older children aged 14 and 20) received a donated mini kitchen with accompanying equipment, which was installed in the previous donated new housing container on 9.2.2021 manufactured by Tehnix doo, in accordance with the decision of the Executive Board of the Croatian Ergonomics Society dated 8.2.2021.

The house of Štefan Rožanković's family was severely damaged in the first earthquakes, and subsequent earthquakes completely destroyed it (as a result, on February 16, 2021, the orange sticker was replaced with a red sticker, and the remains of the house were planned to be demolished).

With the mediation of members of the Railroad Engineer Trade Union of Croatia (SSH), the company Komunalac Vrbovec joined the humanitarian action and donated the service of transporting a housing container from the factory Tehnix doo in Donji Kraljevec to the recipient's location in Greda near Sisak.

For the purchase of the housing container, money is donated from (in alphabetical order): Izidor Alfirević (Croatia), M. Dugue Bernard (France), Tino Bucak (Croatia), David Caple (Republic of South Africa), Denis Alves Coelho (Portugal), Mamas Contantinos (Greece), Czech Ergonomics Association - Premedis Foundation (Czech Republic), Jose Orlando Gomes (Brazil), International Ergonomics Association, Eduard Ivanjko (Croatia), Juraj Ivanjko (Croatia), Marijan Jakovljević (Croatia), Kristian Jambrošić (Croatia), Tanja Jurčević Lulić (Croatia), Diana Milčić (Croatia), Davor Sumpor (Croatia), Irena Šabarić (Croatia), Emilija Zdraveva (Croatia), Jasenka Pibernik (Croatia), Ivana Salopek Čubrić (Croatia), Pero Škorput (Croatia), Adrian Wagner (Austria).

During January and February 2021, in the area of Sisak, Petrinja and Mošćenica, a van of the University of Zagreb Faculty of Transport Sciences (FPZ) twice delivered humanitarian aid to earthquake victims (with an emphasis on families with several small children).

Humanitarian aid was collected by members of the Croatian Ergonomic Society in an action supported by several partners, individuals and organizations as follows:

- teachers, staff and students of the University of Zagreb, Faculty of Transport and Traffic Sciences (FPZ),
- members of the Croatian Acoustic Society,
- parents of students of the foreign language school Heren Doron Špansko from Zagreb,
- members of the Railroad Engineer Trade Union of Croatia (SSH),
- other citizens of the Republic of Croatia.

On behalf of the Croatian Ergonomics Society,

Assoc. Prof. Davor Sumpor, PhD,
Vicepresident

Review of the

8th International Ergonomics Conference - ERGONOMICS 2020

Dear colleagues and friends,

the 8th International Ergonomics Conference - ERGONOMICS 2020 was held from 2-5 December 2020 at the University Campus Borongaj "ZUK Borongaj", in Zagreb, the capital of Croatia.

Ergonomics in Croatia has existed as a scientific and professional discipline for several decades. Let's remember that it all started in 1974 when Prof. Emeritus Dragutin Taboršak, PhD, the founder and the first president of the Croatian Ergonomics Society (CrES), established CrES in Croatia. The achievements as well as recent and relevant ideas in the field of ergonomics have been continuously discussed and exchanged with the international scientific community at the Conferences in the series "Ergonomics", along with other means of communication and networking.

The Conferences in the series "Ergonomics" have been organized by the (CES) from 2001 as part of CES objectives to promote ergonomics and exchange knowledge and experience with the scientific and professional community from Croatia and the world. The Conference traditionally brings together enthusiasts, experts and scientists from Croatia and from all over the world by bringing their know-how to the table, establishing valuable contacts for future cooperation.

This time, the Conference ERGONOMICS 2020 is a joint project with our co-organizing partners:

- CAES (Chinese Association of Ergonomics Societies),
- CES (Chinese Ergonomics Society),
- ErgoWork (Romanian Society on Ergonomics and Workplace Management),
- EST (Ergonomics Society of Taiwan),
- HKES (Hong Kong Ergonomics Society),
- MET (Hungarian Ergonomics Society),
- FPZ (Faculty of Transport and Traffic Sciences), University of Zagreb, Croatia
- FSB (Faculty of Mechanical Engineering and Naval Architecture), University of Zagreb, Croatia
- TTF (Faculty of Textile Technology), University of Zagreb, Croatia.

Furthermore, the Conference has been this time endorsed by:

- IEA (International Ergonomics Association),
- FEES (Federation of European Ergonomics Societies),
- ASC (Acoustical Society of Croatia).

The Conference program this time included more types of oral presentations of papers from the following GROUPS OF TOPICS (not limited):

Aesthetics and Ergonomics;
Biomechanics and Modelling in Ergonomics;
Cognitive Ergonomics;
Education and Trainings in Work Safety and Ergonomics;
Ergonomics for People with Disabilities and Aging Population;

Ergonomics in Product and Process Design;
Ergonomic Regulations, Standards and Guidelines;
Healthcare Ergonomics;
Physical Ergonomics and Human Factors;
Human Comfort;
Safety and Risk Ergonomics;
Psychoacoustic Ergonomics;
Social and Occupational Ergonomics;
Traffic and Transport Ergonomics.

The Organizing Committee (OC) of the *ERGONOMICS 2020* Conference received more than 45 contributions within a diverse range of conference topics. All submissions have been peer-reviewed by the International Scientific Committee and referees from abroad and Croatia, regardless of what type of oral presentation has been chosen (live oral presentation on the spot, real-time online presentation, pre-recorded lecture).

Furthermore, the post-conference Proceedings titled “Proceedings of the 8th International Ergonomics Conference - *ERGONOMICS 2020*” in printed form (Hardcover ISBN: 978-3-030-66936-2) and online form (eBook ISBN: 978-3-030-66937-9) with full texts of all twenty-five accepted and reviewed papers as well as two full texts invited lectures was published by the Springer Publishing Co., in the series “Advances in Intelligent Systems and Computing” available in printed form (Series ISSN: 2194-5357) and online form (Series E-ISSN: 2194-5365).

The forty-five participants came from the following countries: Austria, Croatia, Brazil, Bulgaria, Bosnia and Herzegovina, Greece, Hungary, India, Italy, Poland, Portugal, Romania, Russian Federation, Ukraine, Slovenia, Spain and Taiwan ROC.

During the Conference opening ceremony, Davor Sumpor (President of CrES and Conference Chair) invited Tomislav Mlinarić (FPZ Dean) and Jose Orlando Gomes (IEA Vice-President) to address the participants with a few words of welcome.

In the introductory part of the Conference sessions, the following invited speakers contributed with their lectures: Jose Orlando Gomes (Brazil), Eric Min-Yang Wang (Taiwan ROC), Abhijit Majumdar (India), Nejc Šarabon (Slovenia), Beata Mrugalska (Poland), and Ivana Salopek Čubrić (Croatia).

Due to the global and local situation caused by the Covid 19 virus pandemic, in the circumstances of a situation called "New normal", the Conference was held as a mixed Conference which included the following types of oral presentations: live oral presentation on the spot, real-time online presentation, pre-recorded lecture (only voice as part of Power Point presentation).

The Conference provided a great opportunity for all the participants and all stakeholders from Croatia and abroad to contribute to the advances in ergonomics in Croatia once again despite the situation called "New normal".

I would like to express deep appreciation to all co-organizing partners, patrons and sponsors, reviewers and all the members of all the Conference bodies, authors of the papers and Conference participants, who have all together enabled and helped to make this Conference in the “Ergonomics” series successful once again.

Finally, I am pleased to note that even in the circumstances of the pandemic situation called "New normal", CrES has been receiving active support of our constant and reliable international partners, who we are very proud of, and for which we are very grateful.

We are excited to meet you again in Croatia at the Ergonomics 2022 Conference, with the belief it will be held in person, at the same location in Zagreb.

On behalf of the Organizing Committee of Ergonomics 2020,

Assoc. Prof. Davor Sumpor, PhD,

General Chair



Journals that support the work of the Croatian Ergonomics Society

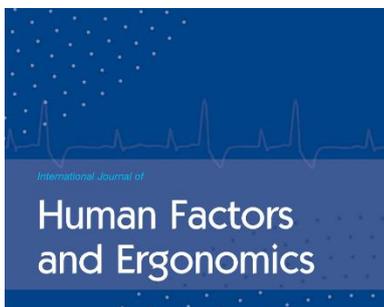


Safety: Journal for the safety in the work organization and living environment

Institute of safety research and development



Promet - Traffic&Transportation



International Journal of Human Factors and Ergonomics

INDERSCIENCE Publishers

UDK 614.8
No 3

CODEN
SIGUAE

ISSN 0350-6886
ISSN 1848-6347 (Online)
VOL. 64

SIGURNOST

Dear colleagues,

we invite you to join our scientific journal "SIGURNOST" by publishing your future papers. The journal is of a multi-disciplinary nature, encompassing fields such as occupational safety, life and work environment protection, ergonomics, traffic safety, fire protection (in industrial, hydro and oil processing plants), occupational medicine, work psychology, etc.

Paper published in journal "SIGURNOST" are accessible in the open archive repositories of electronic journals (since 2005): HRCAK URL: <http://hrcak.srce.hr>. Articles are abstracted by or indexed in Scopus, EBSCO (Academic Search Complete), ProQuest (Engineering Database), ProQuest (Environmental Science Database), Dialog (EMCare®).

Share your knowledge and experiences with the oldest journal that has been published continuously for 65 years.

Sincerely,

Editorial board

sigurnost@zirs.hr



ZAVOD ZA ISTRAŽIVANJE I RAZVOJ SIGURNOSTI d.o.o. - ZAGREB
INSTITUTE OF SAFETY RESEARCH AND DEVELOPMENT - ZAGREB
SIGURNOST 64 (3) 223 - 327 (2022), ZAGREB

SRPANJ - RUJAN

Promet

Traffic & Transportation

Scientific
Journal on
Traffic and
Transportation
Research

Publisher: Faculty of Transport and Traffic Sciences

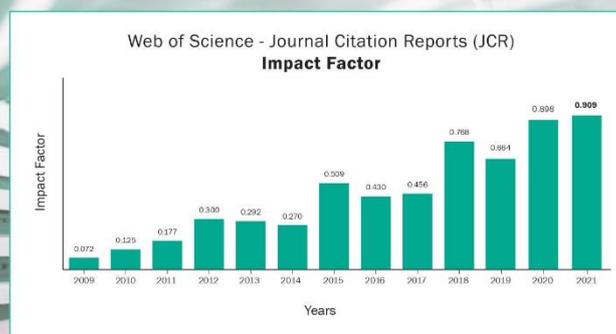
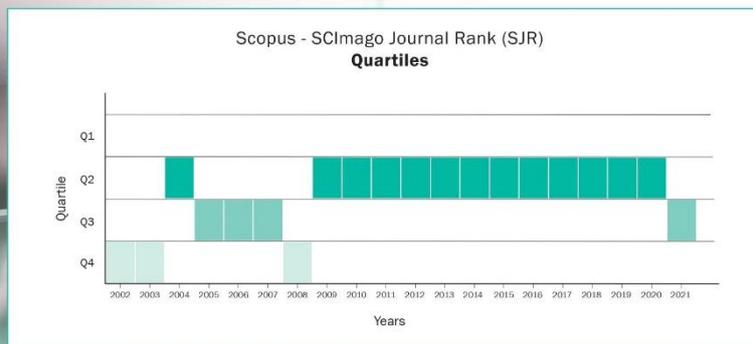


Journal Organization

- Editorial Board
- Scientific Board
- Technical Support Team
- Supporting Institutions
- Peer Reviewers
- Infrastructure Logistics

Journal References

- Web of Science (WoS)
- Scopus
- Open Access
- Double-Blind Peer Review
- Open Journal System (OJS)
- Digital Identifier (DOI)
- Recognizable Profile, Regularity etc.



International Journal of

Human Factors and Ergonomics

Editor-in-Chief:
Dr. Denis A. Coelho

Visit www.inderscience.com/ijhfe
for more information and sample articles



© 2018 Inderscience Enterprises Ltd



Scope of the Journal

ISSN: 2045-7804 (Print), ISSN: 2045-7812 (Online)

IJHFE publishes high quality international interdisciplinary peer-reviewed manuscripts covering ergonomics and human factors in the design, planning, development and management of technical and social systems for work or leisure, including technical systems, equipment, products and the organisation of work.

Contents:

IJHFE welcomes theoretical advances, applications, case studies, new methodologies and procedures, as well as empirical studies, aiming at promoting the advancement of the understanding of people in relation to technology, systems, work organisation and environments. Special Issues devoted to important topics in human factors and ergonomics will occasionally be published. Suggestions for Special Issues are welcome.



Topics covered include:

- Environmental and physical ergonomics
- Human-machine systems design/tool/equipment design
- Eliciting human requirements on technology
- Usability/comfort/pleasure/cognitive engineering of human-technology interfaces
- Anthropometrics/design for people with disabilities
- Design of critical systems/equipment for extreme environments
- Human performance measurement and modelling
- Humans in transportation systems/technologically complex systems
- Cognitive ergonomics, information processing, information/multimedia design, expert systems
- Acceptability and effectiveness of technology change
- Training design, organisational design and psychosocial factors
- Management of the complex participation of people in their environment
- Human-centred/goal-driven design of technical/organisational systems

Not sure if this title is the one for you?

Visit the journal homepage at www.inderscience.com/ijhfe where you can:

- View sample articles in full text HTML or PDF format
- Sign up for our free table of contents new issue alerts via e-mail or RSS
- View editorial board details
- Find out about how to submit your papers
- Find out about subscription options, in print, online or as part of a journals collection

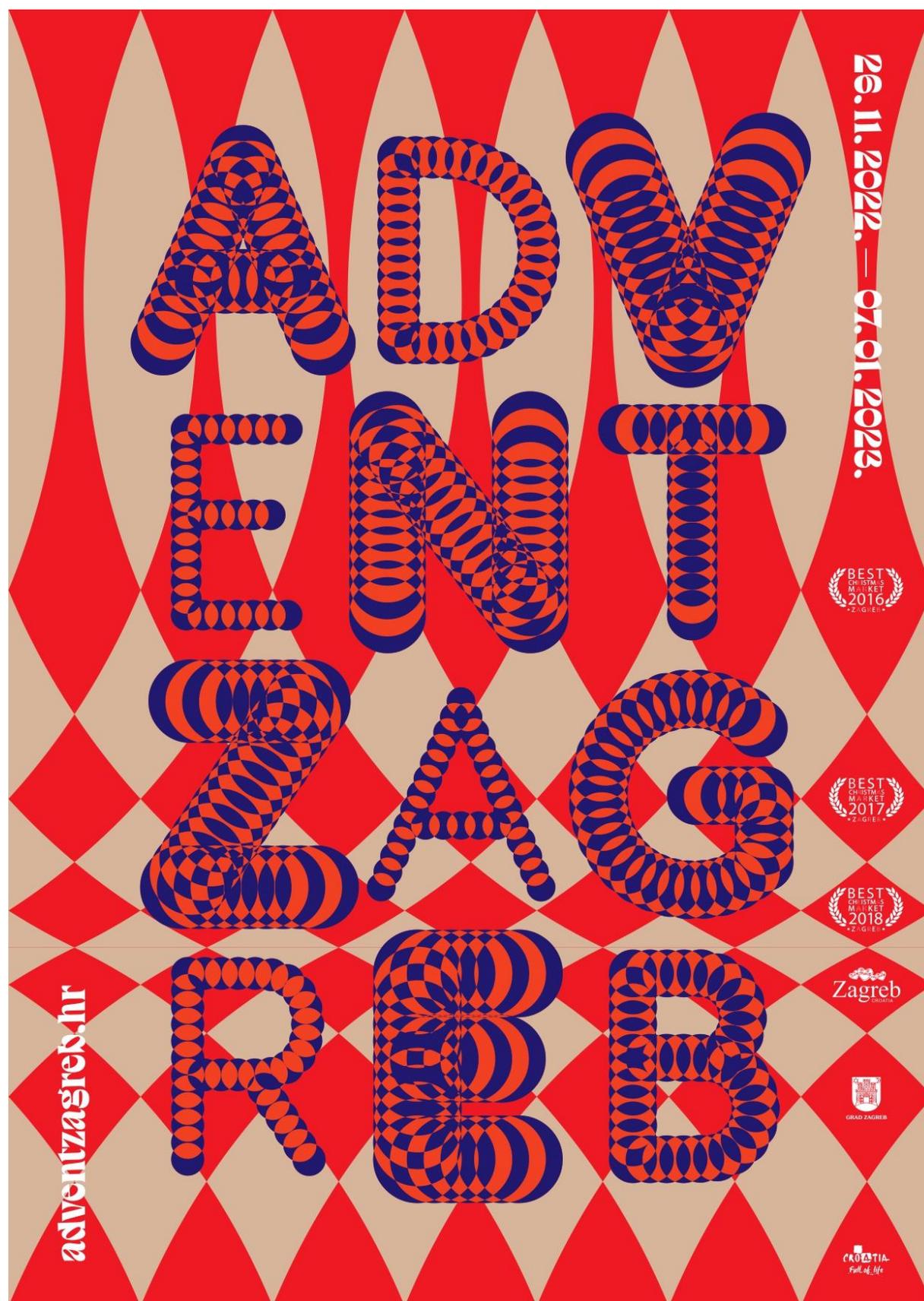
You can order online at www.inderscienceonline.com or download an order form from www.inderscience.com/subform.

This title is part of the Risk, Safety and Emergency Management Collection (see www.inderscience.com/rsem). For library collection subscriptions or for a free institutional online trial, please contact subs@inderscience.com.

© 2018 Inderscience Enterprises Ltd

Visit www.inderscience.com for details of over 420 titles





ISSN 2757-0525



9 772757 052007 >