

## HCI and worker well-being in manufacturing industry

Peer-reviewed author version

GEURTS, Eva; ROVELO RUIZ, Gustavo; LUYTEN, Kris; HOUBEN, Sofie; Weyers, Benjamin; Jacobs, An & Palanque, Philippe (2022) HCI and worker well-being in manufacturing industry. In: Bottoni, P.; Panizzi, E. (Ed.). PROCEEDINGS OF THE WORKING CONFERENCE ON ADVANCED VISUAL INTERFACES AVI 2022, ASSOC COMPUTING MACHINERY, p. 1 -2.

DOI: 10.1145/3531073.3535257

Handle: <http://hdl.handle.net/1942/40905>

# HCI and worker well-being in manufacturing industry

EVA GEURTS, Hasselt University - tUL - Flanders Make, Belgium

GUSTAVO ROVELO RUIZ, Hasselt University - tUL - Flanders Make, Belgium

KRIS LUYTEN, Hasselt University - tUL - Flanders Make, Belgium

STEVEN HOUBEN, Eindhoven University of Technology, The Netherlands

BENJAMIN WEYERS, University of Trier, Germany

AN JACOBS, Vrije Universiteit Brussel - imec, Belgium

PHILIPPE PALANQUE, Université Paul Sabatier - Toulouse III, France

Operators' well-being is a key factor for the success of industrial production processes. Even though research has studied the well-being aspects of the industry, such as support and improvement of ergonomics, there is still a long way to go to achieve a sustainable and healthy work context for manufacturing industry. We believe the Human-Computer Interaction community can contribute by developing research on worker well-being in real-life settings. This workshop intends to offer a venue for HCI researchers that focus on worker well-being for the manufacturing industry and other industry domains.

CCS Concepts: • **Human-centered computing** → **HCI theory, concepts and models**; *Accessibility systems and tools*; • **Security and privacy** → **Human and societal aspects of security and privacy**; **Social aspects of security and privacy**.

Additional Key Words and Phrases: Human-Computer Interaction, Well-being, Manufacturing Industry

## ACM Reference Format:

Eva Geurts, Gustavo Rovelo Ruiz, Kris Luyten, Steven Houben, Benjamin Weyers, An Jacobs, and Philippe Palanque. 2022. HCI and worker well-being in manufacturing industry. In *Proceedings of the 2022 International Conference on Advanced Visual Interfaces (AVI 2022)*, June 6–10, 2022, Frascati, Rome, Italy. ACM, New York, NY, USA, 4 pages. <https://doi.org/10.1145/3531073.3535257>

## 1 INTRODUCTION

In industry, systems are primarily designed and built for production efficiency. Other operational aspects, such as safety, are often enforced by regulatory frameworks that are in place. The emerging Industry 5.0 paradigm complements the technological focus with attention for the human worker [1]. This new paradigm in industry becomes even more important considering the ageing population in many countries [2]. By studying and exploring the relation between interactive systems for industry and worker well-being, we can contribute to the design of systems that promote accessible and inclusive working environments, and that make workers' cognitive and physical well-being primary goals.

## 2 MOTIVATION AND OBJECTIVES

To close the gap in well-being research in manufacturing industry, we explore how we can design, build, and validate user interfaces to support long term growth and development of human workers performing manual labour. We focus

---

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

on research that supports training and maintenance of physical and cognitive skills which eventually leads to improved well-being of workers. For this purpose recent developments in rehabilitation sciences, (eXplainable) AI, safety-critical systems, e-health, persuasive system design, human-robot interaction, and other HCI sub-disciplines need to find their way into the design of industrial interfaces. Only by the integration of these disciplines, we can build systems that improve worker well-being. In addition, we require appropriate validation methodologies that allow us to measure and provide feedback on how industrial systems impact worker well-being.

## 2.1 Topic list

We welcome contributions that can help steering the community efforts providing a healthy, safe and well-adapted industrial work environment for workers around the globe. Our focus is not limited to protection of and ensuring worker well-being, but also includes solutions to enable longer participation in the labour market. Contributions to this workshop can be situated in, but are not limited to, the following topics:

- Intelligible user interfaces
- Persuasive design
- Inclusive design for the workplace
- Explainable AI
- Well-being, workable work and office vitality
- IoT and the connected work floor
- Mental Health (e.g. Depression, Stress, Anxiety)
- Office/workplace ergonomics
- Physical and cognitive workload
- XR for industrial tasks (training and on the job guidance)
- Human-Robot interaction (e.g. exoskeletons, cobots)
- Human-data interaction
- Physicalisation
- Future of work

## 2.2 Target audience

Our target audience include designers, practitioners, researchers, and users of technology in manufacturing industry.

## 3 WORKSHOP PROGRAM

For this first edition of the *HCI and worker well-being in manufacturing industry* workshop, we have received and selected a set of interesting contributions that cover various aspects of worker well-being:

- Hitesh Dhiman, Yutaro Nemoto, Michael Fellmann, Carsten Röcker. *Beyond Efficiency and Productivity: Why and How Worker Assistants should Support Worker Well-Being.*
- Jamil Joundi, Jonas De Bruyne, Aleksandra Zheleva, Wouter Durnez, Jelle Saldien, Klaas Bombeke. *Towards Automated Hesitation Detection During Support-System - Enhanced Industrial Assembly.*
- Marco Fries, Julia Nießner, Thomas Ludwig. *Supporting Production Planning with AI from a Socio-Technical*

*Perspective: First Insights into Current Practices and Needs.*

- Bram van Deurzen, Maria Hendrikx, Davy Vanacken, Kris Luyten. *Work-a-Pose: Ergonomic Feedback and Posture Improvement Interfaces for Long-Term Sustainable Work.*
- Eva Geurts, Steven Hoedt. *Measuring cognitive well-being in an industrial setting.*
- Philippe Palanque, Célia Martinie, David Navarre. *Starting from Usability and User Experience: Remaining Gaps to Fill to Design for and Assess Operators' Well-Being.*

#### 4 ABOUT THE ORGANIZERS

**Eva Geurts** is a postdoc researcher in Computer Science at the Expertise Centre for Digital Media (EDM) of Hasselt University and Flanders Make. In her research, she investigates, among other things, how to design and develop systems to enhance/support certain skills of the human being (in industry/assembly), as well as providing monitoring and informative solutions to support well-being in different contexts, e.g. assembly and physical activity.

**Gustavo Rovelo Ruiz** is a postdoc researcher in Computer Science at the Expertise Centre for Digital Media (EDM) of Hasselt University and Flanders Make. His research explores the way to improve the design and development of computer systems whose aim is to enhance, and recover, physical and cognitive skills of the human being. To this end, in his research he studies among other areas: 3D user interfaces for Augmented and Virtual Reality, intelligible and adaptive user interfaces, persuasive technology, e-Health, and well-being at the work place.

**Steven Houben** is an assistant professor in human-computer interaction at Eindhoven University of Technology. His research focuses on physical and ubiquitous computing systems. His work explores physicalizing human-data interaction to support “from sensor to physicalization” and study new co-creation processes, concepts, interaction paradigms, and data embodiments for non-expert human-data/AI interaction.

**An Jacobs** is currently Part time Associate Professor in the Department of Media and Communication Studies at the Vrije Universiteit Brussel (VUB) in Belgium. She is also Principal Investigator at the research centre SMIT (Studies on Media, Innovation and Technology). In this position, she is Program manager of the Data and Society program, and an interim unit leader of the research unit “ Digital Health and Work” in close cooperation with imec (Belgian/Flemish R&D and innovation hub in nanoelectronics and digital technology). Her scientific research focuses on the people centred development of digital applications in the health and work context (coordination, communication, monitoring, experience). Participation and empowerment are central concepts in the applied mixed methods. As founding partner of the research centre BruBotics (VUB), her team studied human robot interaction in a diverse set of contexts in health care and manufacturing.

**Benjamin Weyers** is an assistant Professor for Practical Informatics leading the Human-Computer Interaction group at University Trier. His research interests include virtual reality, development and evaluation of interactive systems in work, formal methods in human computer interaction, especially the use of Petri net-based description concepts and graph transformation systems for modeling flexible and adaptable user interfaces, interactive data analysis and information visualization, collaborative and learning systems, as well as ambient intelligent systems.

**Philippe Palanque** is a professor of Computer Science at the University of Toulouse III. His research focuses on interactive systems design, development, certification and deployment in various safety critical contexts (e.g., aircraft cockpits, satellite workstations).

**Kris Luyten** is a professor in Computer Science at Hasselt University, a member of the Expertise Centre for Digital Media (EDM) and PI at Flanders Make. He explores how to design, develop, deploy and validate intelligible interactive systems for work environments, amongst others for the manufacturing industry and for work environments that put a

systems for work environments, amongst others for the manufacturing industry and for work environments that put a high cognitive and physical load on their workers.

#### **REFERENCES**

- [1] 2021. Industry 5.0: Towards more sustainable, resilient and human-centric industry. [https://ec.europa.eu/info/news/industry-50-towards-more-sustainable-resilient-and-human-centric-industry-2021-jan-07\\_en](https://ec.europa.eu/info/news/industry-50-towards-more-sustainable-resilient-and-human-centric-industry-2021-jan-07_en) Accessed on 2 May 2022.
- [2] 2022. Ageing workforce. <https://www.eurofound.europa.eu/topic/ageing-workforce> Accessed on 2 May 2022.