An Overview of the 2nd International Workshop on eXtended Reality for Industrial and Occupational Supports (XRIOS)

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ABSTRACT

The 2nd International Workshop on the eXtended Reality for Industrial and Occupational Supports (XRIOS) aims to identify the current state of XR research and the gaps in the scope of human factors and ergonomics, mainly related to industrial and occupational tasks, and discuss potential future research directions. XRIOS was held for the first time at IEEE VR 2022, where it served as the first venue to build an interdisciplinary research community that bridges XR developers/practitioners and human factors and ergonomics researchers interested in industrial and occupational XR applications. XRIOS 2023 follows the success of XRIOS 2022 in response to society's growing needs by expanding the XRIOS community and providing more opportunities.

Keywords: Extended reality, mixed reality, virtual reality, augmented reality, industrial support, occupational support, human factors, ergonomics.

Index Terms: General and reference [Document types]: Surveys and overviews; Human-centered computing [Human computer interaction (HCI)]: Interaction paradigms—Mixed/augmented reality; Human-centered computing [Human computer interaction (HCI)]: Interaction paradigms—Collaborative interaction; Human-centered computing [Collaborative and social computing]: Collaborative and social computing theory, concept and paradigms—Computer supported cooperative work

1 OVERVIEW

Industry 4.0 has been proposed as a new phase in the industrial revolution, integrating digital and physical worlds through technology into industrial procedures [7]. Despite the promising benefits of using smart sensors, embedded systems, and cyber-physical systems, human operators remain an essential part of any industrial process. In this vein, solutions using eXtended Reality (XR) can be considered a key pillar of the transition to Industry 4.0 and smart manufacturing, by providing the users (e.g., industry employees) with timely and efficient instructional training and operation aids [1]. XR technologies have been applied to a wide range of industries and occupational areas, such as maintenance, quality control, training, education, remote collaboration, and transportation [2, 6, 9]. For example, occupational employees can improve their work performance while reducing mental and physical workloads through effective XR systems (e.g., Metaverse and Digital Twin). In summary, XR can contribute to increasing users' motivation, interest, and situation awareness [5], resulting in higher efficiency and efficacy, as well as less error rate and faster time completion. It allows inexperienced users to quickly learn how to perform new tasks, resulting in a workforce that can quickly adapt and perform more informed procedures in such scenarios. Furthermore, as XR applications supporting industrial and occupational tasks include physical movements and activities, it is necessary to perform a variety of assessments from ergonomics and physiological perspectives [8]. However, as the workplace conditions become diverse, the XR technologies should be adaptive and innovative to meet the new industrial needs.

This workshop aims to identify the current state of XR research and the gaps in the scope of human factors and ergonomics, mainly related to the industrial and occupational tasks, and discuss potential future research directions. The workshop builds a community that bridges XR developers, human factors, and ergonomics researchers interested in industrial and occupational applications, while providing an opportunity for academic and industry researchers to present their latest work or research in progress.

XRIOS 2023 follows in the footsteps of the 1st XRIOS workshop that was successfully held at IEEE VR 2022, thanks to the passionate presenters and attendees [4]. Fourteen quality papers were published through the IEEE Digital Library as a form of IEEE VR 2022 Abstract and Workshops proceedings. The published papers discussed the current state-of-the-art opportunities, challenges in XR technologies for industrial and occupational supports, and future directions of enterprise XR, while covering various XR industry and healthcare applications. We expect that the 2nd XRIOS workshop continues the success of the previous workshop.

2 CALL FOR PAPERS

XRIOS 2023[1] is held at IEEE International Conference on Virtual Reality and 3D User Interfaces (IEEE VR) 2023, which is the largest, leading academic venue in the field of XR. We have multiple research paper presentations, invited talks, and discussion sessions. Here, we describe our approach to promote paper submissions with the details of paper topics and types.

2.1 Topics

To cover the wide range of XR applications in the context of industrial and occupational supports, we tried to include various XR-

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[1]XRIOS webpage: https://sites.google.com/view/xrios

related topics, which embrace different disciplines and perspectives. Some of the highlighted topic areas include, but are not restricted to:

- Industrial and occupational supports in Metaverse
- Industrial and occupational applications in XR
- Occupational safety and health training in XR
- XR for laborers in workplaces (e.g., construction, healthcare)
- XR in dynamic environments (e.g., transportation, emergency care support workers)
- XR for industrial job training
- XR for industrial hygiene
- Exoskeletons with XR for rehabilitation
- Human-robot interaction/collaboration with XR
- Physical and musculoskeletal assessment in XR
- Physiological and fatigue assessment in XR
- Physical and cognitive workload in XR
- Ergonomic considerations for wearable XR devices
- Working from home with XR in post COVID-19
- Remote collaboration and learning in XR
- Office/workplace ergonomics in XR
- Measures and human-performance modeling in XR
- Digital twin for industrial applications
- Product inspection, monitoring, operations (e.g., maintenance and repair tasks, assembly procedures, co-located or remote collaboration, and others)
- Advancements in XR technology for industrial scenarios
- Field studies evaluating the use of XR technology
- Novel approaches for training operators
- Approaches to support XR accessibility in shop-floor contexts
- New types of industrial collaborative XR experiences

*** A few high-quality selected papers (e.g., Best Papers) are invited to submit their extended papers to Special Issue of Elsevier Computers & Graphics Journal - "Special Section on Recent Advances in Industrial eXtended Reality (XR)" (`https://www.sciencedirect.com/journal/computers-and-graphics`, Guest Editors: Bernardo Marques, Samuel Silva, Kangsoo Kim, and Heejin Jeong).

2.2 Paper Types and Advertisement

While inviting world-leading researchers in the field, we sought various types of paper submissions (up to 8 pages, excluding references), which include:

- **Position Papers** that identify and share insightful opinions and ideas.
- **Survey Papers** that capture the current states of research and present potential research gaps and future directions.
- **Project Papers** that give an overview of an ongoing/planning project by describing the approach and goals of the project.
- **Research Papers** that contribute state-of-the-art advances and provide results as evidence, which can include industrial/occupational XR applications and systems.

For effective communication and visibility, we designed a digital call-for-paper (CfP) poster (Figure 1). The CfP flyer was shared in the relevant research communities via multiple online resources (e.g., IEEE VR mailing list[2], 3DUI mailing list[3], Human Factors and Ergonomics Society's Connect[4], ACM CHI mailing list[5]), and social media (e.g., Slack, Twitter, and LinkedIn).

[2]IEEE VR mailing list: ieeevr-group@uncc.edu

[3]3DUI mailing list: 3dui-g@vt.edu

[4]Human Factors and Ergonomics Society's Connect: `https://connect.hfes.org/`

[5]ACM CHI mailing list: CHI-ANNOUNCEMENTS@listserv.acm.org

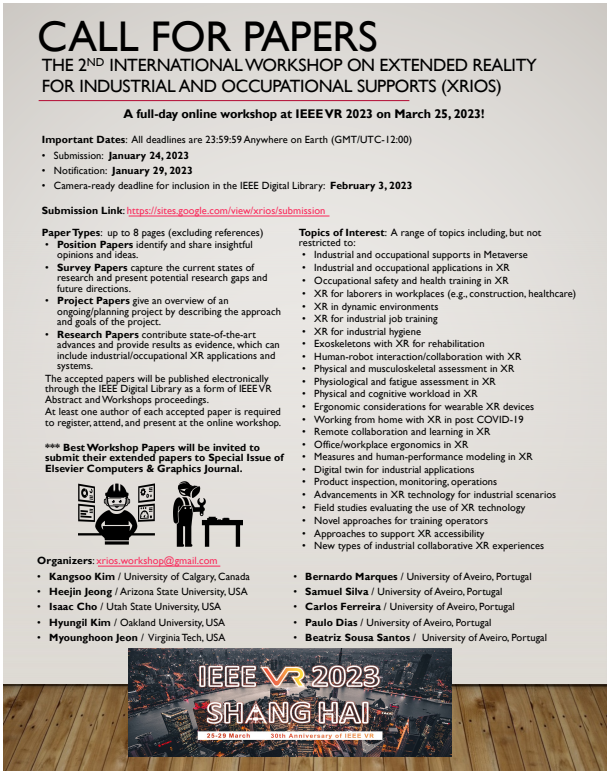

Figure 1: The Workshop Digital Poster "Call for Papers".

2.3 Important Dates

All deadlines are 23:59:59 Anywhere on Earth (GMT/UTC-12:00)

- **Paper Submission**: January 24, 2023
- **Acceptance Notification**: January 29, 2023
- **Camera-ready for inclusion in the IEEE Digital Library**: February 3, 2023
- **XRIOS Workshop**: March 25, 2023

3 Organization and Schedule

XRIOS 2023 is organized as a full-day *online* workshop at IEEE VR 2023. The tentative schedule with three invited talks and 15 paper presentations is shown in Table 1. Small group discussions may be included depending on time availability.

3.1 Invited Talks

Speaker 1: Francisco Rebelo (University of Lisbon)

- *Title*: The Future of the Industry: Challenges and Prospective Solutions to Protect the Workers in Critical Situations
- *Abstract*: Smart sensors, embedded systems, cyber-physical systems, and artificial intelligence are promising technologies for a new industrial revolution. However, the practical introduction of those technologies will bring significant societal challenges. We can have the best technological solutions for future industrial systems, but it will not be helpful if the workers refuse to use them. Many problems can occur, mainly related to the worker's interaction with technology and the fear of losing their jobs. In this context, the human-centered design puts the workers at the center of the technological system. This presentation will show some work we have developed in the ergoUX Lab since 2008, mainly in technological-based solutions to increase behavior compliance with safety information

during emergencies. We have tested various technology-based solutions that protect workers in emergencies, such as building fires. In this context, we use virtual reality to simulate dangerous situations where these new technological-based solutions are developed to protect people's lives. The results we have achieved are encouraging; in simulated situations, we verified that our technological-based solutions significantly improve the behavioral compliance of people in critical situations.
- *Short bio*: Francisco Rebelo is an Associated Professor at the School of Architecture at the University of Lisbon, director of the ergoUX lab, and researcher at the Centre of Architecture, Urban Planning and Design and in the Interactive Technologies Institute – LARSyS. His teaching and research focus on understanding and measuring human performance and experiences resulting from the use, or anticipated use, of a product, service, or system. At the applied level, his goal is to integrate ergonomics, neuroscience, and technological tools, to design transformative human experiences that improve people's lives' performance, fun, safety, and health. Over the last 25 years, he has been involved in several projects on virtual reality, game design, usability, and user experience in consumer products, smart cities, industrial systems, and education/training. His research is founded by Portuguese and European Agencies and Companies (i.e., Thales, Embraer, Siemens, VW). His have published over 250 articles in journals and book chapters and edited 12 books.

Speaker 2: Heiko Wenczel (Epic Games)

- *Title*: How Game Engines Drive Innovation in the Immersive Space
- *Abstract*: XR experiences and Human Machine Interfaces are becoming key elements in design and manufacturing for various industries. Game engines are becoming an essential component in the development of the experience and interfaces. On top of that they are key in deploying those inside products, the cloud and on-site. With Unreal Engine, the quality and interactivity can be pushed to new heights. Join this session to hear more about our view on the market and the latest highlights.
- *Short bio*: Heiko Wenczel started his career at Mercedes Benz in 2004 with a focus on planning and visualization.Targeting data models and processes, he continued working in the plant simulation space and joined a team focused on building the next-gen visualization and configuration system for Mercedes' passenger cars. Heiko joined Mackevision as president and moved to Detroit in 2008 to establish Mackevision Corporation. After that, he was involved in several creative content pipelines for major automotives globally. After the acquisition by Accenture Interactive he was focused on building similar workflows for all industry verticals. In a return to innovation and technology, Heiko joined Epic Games to drive the development of next-gen data and visualization platforms in automotive, manufacturing & HMI.

Speaker 3: Mark Billinghurst (University of Auckland)

- *Title*: Designing Collaborative Systems for Industrial XR
- *Abstract*: XR technologies of Augmented Reality (AR) and Virtual Reality (VR) enable the development of new types of collaborative experiences that address the needs of industry. This talk presents research directions in collaborative AR and VR and discusses their application in an industrial setting. In particular it describes the emerging field of Empathic Computing which combines AR, VR and physiological sensing to enable people to connect together in new ways. Examples will be presented from research at the Empathic Computing Laboratory, and directions for future research discussed.

Table 1: Tentative workshop schedule.

Session	Content	Duration (min)
Session 1	Opening Remarks	10
	Invited Talk 1	45
	Paper Session 1	60
	Break	5
	Paper Session 2	60
	Session Closing	5
Session 2	Session Opening	5
	Paper Session 3	75
	Break	5
	Paper Session 4	60
	Break	5
	Invited Talk 3	45
	Awards and Closing Remarks	20

- *Short bio*: Mark Billinghurst is Director of the Empathic Computing Laboratory, and Professor at the University of South Australia in Adelaide, Australia, and also at the University of Auckland in Auckland, New Zealand. He earned a PhD in 2002 from the University of Washington and conducts research on how virtual and real worlds can be merged, publishing over 700 papers on Augmented Reality, Virtual Reality, remote collaboration, Empathic Computing, and related topics. In 2013 he was elected as a Fellow of the Royal Society of New Zealand, and in 2019 was given the ISMAR Career Impact Award in recognition for lifetime contribution to AR research and commercialization. In 2022 he was inducted into the inaugural class of the IEEE VGTC VR Academy, and in 2023 elected as a Fellow of the IEEE.

3.2 A Summary of Accepted Papers

All submissions were reviewed by the single-blind peer-review process. Each paper was carefully reviewed by three reviewers (workshop organizers) while avoiding potential conflicts. A total of 15 papers have been accepted finally. Table 2 shows the accepted papers categorized by topic, method, technology, and use case.

Among these, one survey paper (Papers #13) introduces a concept of Altered Reality (AltR), which simulates physical transformation with virtual contents using Augmented and Diminished Reality techniques, and capture the industrial use cases. Topics presented in the rest research and project papers cover various industrial application contexts, including maintenance, manufacturing, product design, and culinary. The papers not only present some early-stage concept designs and ideas, but also share their experience in prototyping new XR applications as proofs-of-concept. Even beyond this prototyping, we identified certain types of user-based experiments are included in most papers ($n = 10$). This may reflect the recent trend of a growing number of user studies in XR research [3]. While three papers (Papers #5, #7, and #9) have preliminary pilots, five papers (Papers #6, #10, #11, #14 and #15) include more structured user studies with tens of participants. Interestingly, two papers (Papers #1 and Papers #3) actually involve domain experts in their studies to examine their developed systems/services in more practical context. In terms of XR devices, most papers use or target head-worn devices in their projects, which we also found the same trend in XRIOS 2022 publications. This may be because the head-worn displays can allow the users to freely use their hands, and may be more suitable

for the tasks given in many industrial contexts. Here we summarize the key contributions of the papers, which the authors provided.

- Paper #1 (Bozzi et al.): *Fused deposition modeling (FDM) is the most widespread form of additive manufacturing due to its low cost and versatility. However the repair of FDM printers often requires trained operators. We explore the applicability of augmented reality to guide users through printer repair.*
- Paper #2 (Mazeas et al.): *Telexistence offers new opportunities for remote maintenance in the maritime sector. This study presents a framework for evaluating machinery maintenance using a real robot, a simulated environment, and a VR interface. Future steps include comparison with direct teleoperation.*
- Paper #3 (Maio et al.): *We propose a Pervasive AR prototype to support real-time data monitoring and problem detection of industrial assembly lines. A Human-Centered Design (HCD) methodology was used to identify stakeholders' needs, and define requirements. Also, we describe first impressions on the industrial shop floor.*
- Paper #4 (Marques et al.): *This position paper proposes a vision for using data collection and Mixed Reality (MR), thus supporting industrial product co-design. This combination can be highly flexible in providing a perspective that overlays user feedback in a digital form on top of the physical world.*
- Paper #5 (Jeong et al.): *We propose a tele-presence framework, Table2Table (T2T), where a student in one space can mimic the actions of the instructor in another space. T2T identifies object mappings, recognize the instructor's action, and animate it for the student.*
- Paper #6 (Talami et al.): *The paper presents a user research process to inform the design of an AR system for dyads of maintenance workers in wastewater treatment. Based on the results, the paper shares lessons learned and how dyad familiarity may impact the usability of AR for remote maintenance.*
- Paper #7 (Black et al.): This paper provides an overview of the human teleoperation concept and its application to tele-ultrasound. While the graphics, communications, controls, and haptics subsystems are explained, the pilot results show the developed system's efficacy in a clinical teleoperation use-case.
- Paper #8 (Marques et al.): *This position paper proposes a vision for combining MR and a Virtual Assistant (VA) for supporting asynchronous remote guidance in Industrial Scenarios. The arguments in favor of this position are presented and future directions are proposed.*
- Paper #9 (Albawaneh et al.): *This paper proposes an augmented reality aid system to support warehouse order-picking tasks for foreign workers. A pilot user study demonstrated the potential of the proposed system to enhance worker performance, perceived safety, and satisfaction as compared to the current practices in warehouses.*
- Paper #10 (Bayro et al.): *The study introduces the XR Vest, a new XR training device that improves demonstration-based training (DBT) by combining first- and third-person views for greater engagement, safety, and immersion, which reduces cognitive load and increases usability, compared to traditional DBT methods.*
- Paper #11 (Ghasemi et al.): *This paper presents sAR Kitchen, a cooking assistant using spatial AR to enhance culinary training, which significantly reduces perceived workload & increases usability compared to traditional video tutorials, thus, highlighting the potential for sAR to provide user-friendly learning.*
- Paper #12 (Stacchio et al.): *We here describe AnnHoloTator, a collaborative mixed-reality platform that allows users in manufacturing settings to visualize and manipulate digital documents directly in AR. The system provides the advantage of supporting an easy annotation and sharing of virtual documents.*
- Paper #13 (Li et al.): *To promote the industrial development and use of simulated plausible physical-virtual interactions, we described the concept of virtually altering physical objects and summarized its characteristics and industrial use cases via a literature review and ten expert interviews.*
- Paper #14 (Nguyen et al.): *"In this paper, we present an immersive VR-based simulation that allows users to freely explore a dairy farm virtually. By using virtual reality technology, we aim to address hesitation or misunderstanding about production practices and bring transparency to the agri-food system.*
- Paper #15 (Woodworth et al.): *We investigate 9 visual cues intended to guide or restore attention to target objects across a wide range of conditions in industrial settings. Results reveal different patterns of cue effectiveness for restoration than for conventional guidance.*

4 ORGANIZERS

We formed a collaborative group of ten international researchers, who have intensive research expertise in XR and human factors for organizing this workshop.

Kangsoo Kim is an Assistant Professor in the Department of Electrical and Software Engineering at the University of Calgary. His research broadly covers pervasive context-aware XR systems and intelligent social interactions in XR. While focusing on user experience and perception/cognition in XR, he has published dozens of research papers in top-tier conferences and journals, including IEEE TVCG, IEEE VR, IEEE ISMAR, and ACM IVA, achieving multiple Best Paper Awards.

Bernardo Marques is a Research Assistant at the Digital Media and Interaction Research Centre of the University of Aveiro (DigiMedia). He is also a Research collaborator at the Institute of Electronics and Informatics Engineering of Aveiro (IEETA), University of Aveiro (UA). His interests include human-centered technologies, with a focus on computer- supported cooperative work, computer graphics, extended reality, as well as information visualization, with a particular interest in Industrial scenarios. Previous to this, he worked in the Industry sector as an Electrician.

Heejin Jeong is an Assistant Professor in the Polytechnic School, The Ira A. Fulton Schools of Engineering at Arizona State University. His research focuses include extended reality systems for occupational safety enhancement and healthcare rehabilitation training and human-robot collaboration in Industry 4.0 manufacturing systems. He is directing the Human-in-Mind Engineering Research (HiMER) Lab, where develops human behavior models based on experimental/physiological data and cognitive processing theories. The lab also develops XR-based experimental prototypes and tools to evaluate the usability and effectiveness of human interactive systems. His research has been funded by government and research sponsors, such as NSF, NIOSH.

Samuel Silva is an Assistant Professor at the Department of Electronics, Telecommunications and Informatics (DETI), as well as a Researcher at the Institute of Electronics and Informatics Engineering of Aveiro (IEETA), University of Aveiro (UA). His interests include human-centered technologies with a focus on assistive

technologies, multimodal interaction, computer vision, computer graphics, and extended reality.

Isaac Cho is an Assistant Professor in the Computer Science department at Utah State University. He is also an adjunct professor in the Computer Science Department at the University of North Carolina at Charlotte and an affiliated faculty member of the Ribarsky Center for Visual Analytics (the Charlotte Visualization Center).His main research interests are Spatial 3D User Interfaces, Multi-scale Virtual Environment, Interactive Visual Analytics, and Human-Computer Interactions. He has served as organizing and program committee member in several international conferences such as IEEE VR, IEEE Visualization, IEEE AIVR, and more.

Carlos Ferreira is Associate Professor at the Department of Economics, Management, Industrial Engineering and Tourism (DEGEIT), as well as a Researcher at the Institute of Electronics and Informatics Engineering of Aveiro (IEETA), University of Aveiro (UA). His interests include human-centered technologies with a focus on information systems, operational research, statistical data analysis, as well as extended reality, data and information visualization, with a particular interest in industrial scenarios.

Hyungil Kim is an Assistant Professor in the School of Engineering and Computer Science at Oakland University. He is leading the Human-Centered Engineering lab and is a member of Oakland University's Augmented Reality Center. His research explores new methods for the requirements analysis, design, prototyping, and evaluation of extended reality applications with an emphasis on human-technology partnerships at future workplaces. He has published over 20 papers on augmented reality in top conferences and journals including IEEE VR, IEEE ISMAR, and IEEE TVCG.

Paulo Dias is an Assistant Professor at the Department of Electronics, Telecommunications and Informatics (DETI), as well as a Researcher at the Institute of Electronics and Informatics Engineering of Aveiro (IEETA), University of Aveiro (UA). His interests include human-centered technologies with a focus on extended reality, computer vision, computer graphics, 3D reconstruction, as well as data and information visualization, with a particular interest in Industrial scenarios.

Myounghoon Jeon is an Associate Professor of the Department of Industrial and Systems Engineering and the Department of Computer Science (by courtesy) at Virginia Tech. His Mind Music Machine Lab tries to integrate different levels of research on human-automation (vehicles, robots, and agents) interaction, including neurological, psychological, and computational approaches. He has published over 200 papers and organized over 30 workshops in international conferences.

Beatriz Sousa Santos is an Associate Professor at the Department of Electronics, Telecommunications and Informatics (DETI), as well as a Researcher at the Institute of Electronics and Informatics Engineering of Aveiro (IEETA), University of Aveiro (UA). Her interests include human-centered technologies with a focus on extended reality, as well as data and information visualization, with a particular interest in Industrial scenarios.

5 Conclusions

We hope that XRIOS 2023 continues the success of the previous workshop. This overview of the accepted papers with diverse concept designs, research methods, and XR application prototypes significantly contribute to the design of XR technologies in various industry settings and guide researchers to more impactful research directions. We will continue this workshop series in the future through IEEE VR and other conferences (e.g., ACM CHI and IEEE ISMAR Conferences). Also, we guest-edit the special issue on the same topic in Elsevier Computers & Graphics Journal. We thank all the authors, reviewers, and workshop chairs for contributing to this exciting workshop.

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Table 2: A list of the accepted papers. (AR: Augmented Reality, MR: Mixed Reality, VR: Virtual Reality, DR: Diminished Reality)

#	Title	Authors	Topic/Domain	Method	Technology	Use case
1	Towards Augmented Reality Guiding Systems: An Engineering Design of an Immersive System for Complex 3D Printing Repair Process	Bozzi et al.	Maintenance	Prototyping and Evaluation (Expert)	AR (HMD)	3D printer repair assistance
2	Telexistence-Based Remote Maintenance for Marine Engineers	Mazeas et al.	Maintenance	Prototyping	AR (HMD)	Remote maintenance and collaboration for marine engineers
3	Real-Time Data Monitoring of an Industry 4.0 Assembly Line using Pervasive Augmented Reality: First Impressions	Maio et al.	Manufacturing	Prototyping and Evaluation (Expert)	AR (HMD)	Assembly line task aid
4	'Push the Industrial Complexity Away': A Vision for using Data Collection and Mixed Reality as an Analysis Tool in Industrial Product Co-Design	Marques et al.	Product Design	Concept	AR/MR & VR	Multi-user collaborative product design
5	Table2Table: Merging "Similar" Workspaces and Supporting Adaptive Telepresence Demonstration Guidance	Jeong et al.	Culinary	Prototyping and Evaluation (Pilot)	AR (HMD)	Remote assistance for cooking training
6	AR in remote maintenance: Empirical user research with dyads	Talami et al.	Maintenance	Prototyping and Evaluation (User Study)	AR (Hand-held, HMD)	Remote assistance/collaboration system for city wastewater treatment and maintenance workers
7	Mixed Reality Human Teleoperation	Black et al.	Medical	Prototyping and Evaluation (Pilot)	AR (HMD), VR (Desktop)	Tele-ultrasound operation and collaboration
8	Towards Asynchronous Mixed Reality Remote Guidance supported by a Virtual Assistant: Proposal of a Conceptual Model	Marques et al.	General (Guidance)	Concept	AR/MR (HMD)	Asynchronous agent-based remote guidance
9	Augmented Reality for Warehouse: Aid System for Foreign Workers	Albawaneh et al.	Logistics	Prototyping and Evaluation (Pilot)	AR (HMD)	Warehouse order-picking aid
10	eXtended Reality Vest: A New Approach to Demonstration-Based Learning	Bayro et al.	General (Training)	Prototyping and Evaluation (User Study)	VR (HMD), Wearable Screen	Demonstration-based VR training
11	Enhancing Culinary Training with Spatial Augmented Reality: A User Study Comparing sAR Kitchen and Video Tutorials	Ghasemi et al.	Culinary	Prototyping and Evaluation (User Study)	AR (Projection)	Step-by-step cooking training
12	AnnHoloTator: A Mixed Reality Collaborative Platform for Manufacturing Work Instruction Interaction	Stacchio et al.	Manufacturing	Prototyping	AR/MR (HMD)	AR work instruction and collaboration
13	Exploring Industrial Uses of Virtually Altering the Physical World	Li et al.	General	Survey	AR & DR	Various applications reviewed/suggested
14	A Virtual Farm Tour for Public Education about Dairy Industry	Nguyen et al.	Agriculture	Prototyping and Evaluation (User Study)	VR (HMD)	Dairy farm simulation for public education
15	Design and Evaluation of Visual Cues for Restoring and Guiding Visual Attention in Eye-Tracked VR	Woodworth et al.	General (Training)	Evaluation (User Study)	VR (HMD)	Visual attention cues for guidance and restoration in VR training