

2024 10th International Conference on Virtual Reality (ICVR 2024)

**Bournemouth, United Kingdom
24-26 July 2024**



**IEEE Catalog Number: CFP24AW9-POD
ISBN: 979-8-3503-6424-8**

**Copyright © 2024 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP24AW9-POD
ISBN (Print-On-Demand):	979-8-3503-6424-8
ISBN (Online):	979-8-3503-6423-1

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

2024 the 10th International Conference on Virtual Reality (ICVR 2024)

Table of Contents

Preface	vii
Committees	viii

➤ Virtual Environment and Perception

Achieving Common Ground: Collaborative Information Seeking in an Asymmetric Virtual Environment.....	1
<i>Anita Komlodi, Dalma Geszten, Karoly Hercegi, Alyson L. Young, Shanna Russ, Wayne G. Lutters</i>	
Role-Specific Physiological Responses and Quality of Experience in Collaborative Virtual Reality Tasks: A Comparative Study of Leaders and Followers	11
<i>Bhagyabati Moharana, Conor Keighrey, Niall Murray</i>	
Aspherical Micro-Optical Simulation and Design for Enhancing Image Quality at Large FOV in Lenslet Array Near-eye Display	21
<i>Bi Ye, Tianwen Hou, Lei Zhao, Chaohao Wang, Xinzhu Sang, Chengrui Le</i>	
Immersive Learning: Exploring Learning Management Systems in Virtual Reality.....	29
<i>Lijo P. Thomas, Juby Thomas, Sateesh Kumar TK, Vishnu Achutha Menon</i>	
Integrating Design Psychology in VR Scenarios to Improve Virtual Reality Experiences.....	37
<i>Hui Liang, Haoming Xu, Yi Wang, Junjun Pan</i>	
GuardianVR: Fostering Empathy Through Virtual Reality.....	47
<i>Tania Vasquez Sal y Rosas, Renato Castillo Rengifo, Iván Bautista Fuentes</i>	
Towards Automated Hesitation Detection During Support-System Enhanced Industrial Assembly.....	53
<i>Jamil Joundi, Jonas De Bruyne, Aleksandra Zheleva, Wouter Durnez, Jelle Saldien, Klaas Bombeke</i>	
Virtual Reality-Based Emergency Fire-Fighting on Methanol-Fueled Ship During Bunkering Operation	58
<i>Pinar Bilgin, Eric Lim</i>	
3D Rendering Impact in Virtual Reality Based Architectural Design Collaboration	62
<i>Jin Gang Lee</i>	
➤ Virtual Reality	
Gaze-Adaptive Subtitles for 360 °Videos in Virtual Reality	68
<i>Tianrui Hu, Wenjun Hou</i>	
Philosophical Perspectives on Realism in Virtual Production (VP) and Extended Reality (XR) in Contemporary Film and TV Production	78
<i>Aneta H. Postek-Mioduszezewska</i>	
The Data Factory: Findings from an Extended Reality-based Hackathon for Data Science Education	85
<i>William Hurst, Orestis Spyrou, Caspar Krampe</i>	

Pseudo-Haptics for Weight Perception in VR: Controller vs. Bare Hand Interactions with Tracking Delay and Vertical Offset	91
<i>Chiwoong Hwang, Tiare Feuchtner, Kaj Grønbaek</i>	
A Review Study: Using Serious Games and Virtual Reality to Support Mental Health and Cognitive Behavioral Therapy.....	100
<i>Mashaal Bin Sabbar, Rich Davison, Gary Ushaw</i>	
➤ Augmented Reality	
Enhancing Immersive Representation in Building Information Modelling: Towards a Framework for Effective Integration of Immersive Technology in the AEC Sector.....	106
<i>Simone Balin, Cecilia Maria Bolognesi, Paolo Borin</i>	
Enhancing Immersive Relaxation: Exploring the Fusion of ASMR Animation and Virtual Reality	113
<i>Jiahao Du</i>	
Enhancing Usability with Virtual Imagery: Insights into Feedback Mechanism from a BCI-VR Integrated System	121
<i>Annan Lu, Mengjie Huang, Luyao Tang, Rui Yang</i>	
User Experience Research Play Card in Augmented Reality: A Sensemaking Case Study on Designing Visibility and Modality	127
<i>Sha Liang, Huseyin Dogan, Stephen Giff, Renée Barsoum</i>	
Digital Exhibition of Traditional Chinese Water Measurement Instruments Based on Augmented Reality Technology	133
<i>Yang Liu, Baolu Fan, Guojun Yin, Jianyong Wu</i>	
Augmented Reality Enhanced: 3D Crowd Reconstruction from a Single Viewpoint.....	140
<i>Xiaohan Sun, Xiaosong Yang</i>	
➤ Virtual Technology and Immersive Interactive Experience	
Deep Reinforcement Learning-based Training for Virtual Table Tennis Agent.....	146
<i>Daqi Jiang, Hock Soon Seah, Budianto Tandianus, Yiliang Sui, Hong Wang</i>	
Embodied Cognition and MR-Based Interactive Narrative Design: The Case of ‘Encountering Sanmao’ at the Former Residence of Zhang Leping	153
<i>Yun Liu, Shasha Liao, Yunshui Jin, Minhua Ma, Wenxun Tang</i>	
2.5D Immersive Representation of Chinese Claborate-Style Painting in Virtual Reality	161
<i>Yuting Cheng, Mengjie Huang, Jiashu Yang, Wenxin Sun</i>	
HSM: Hand Surface Menu Solution for Interaction in VR.....	167
<i>Hailong Zhang, Lin Li, Chang Xue, Xiaocai Wei, Yin Zhou</i>	
Physically-based Virtual Picking System for Hand-Fruit Interaction Using Data Gloves	177
<i>Shicheng Qiu, Yong Zhao, Zhengrong Li, Zhiyi Zhang, Shaojun Hu</i>	
A Cross-Platform Guidance System for Virtual Reality-Based Upper Limb Rehabilitation	184
<i>Jiashu Yang, Wendi Wang, Mengjie Huang, Wenxin Sun, Rui Yang</i>	
Grasping Objects in Immersive Virtual Reality Environments: Challenges and Current Techniques	190
<i>Mingzhao Zhou, Nadine Aburumman</i>	
Evaluating Stereo and Head-Coupled Perspective Cues in Collaborative Immersive Environments.....	198
<i>Maximilian Schulze, Sebastian Keppler, Bozana Meinhardt-Injac, Johann Habakuk Israel</i>	

Research on the Influencing Factors of Users' Engagement Behavior on Cultural Tourism Meta-universe Platform: The Chain Mediating Effect of Immersive Experience and Perceived Value	207
<i>Yu Shu, Wen Jinghan</i>	
Development of an Immersive Learning Environment for Fundamentals of Nursing Labs	213
<i>Mohammad F. Obeid, Ahmed Ewais, Mohammad Asia</i>	
➤ Computer Vision and Image Reconstruction	
Target-specific and Temporal Transformer for Visual Tracking	218
<i>Jiapeng Hu, He Zhao, Jiong Jia, Youming Chen, Liang Zhao, Yamin Han, Meili Wang</i>	
3D Remote Scene Reconstruction via Graph Convolution	227
<i>Xing Li, Mingyu Sun, Qiaofeng Ou, Yan Mo, Sikun Liu, Zhibo Rao</i>	
Immersive Visualisation of Point Cloud Data of Railway Environments.....	233
<i>Bram Ton, Niek Tempert, Danny Plass</i>	
Point HorNet: Higher-Order Spatial Interaction Network for Point Clouds	240
<i>Hao Yuan, Linqing Liu, Tingting Yan, Wenjing Zhang, Qinghe Liu, Juanjie Wei, Ziang Wu, Huijun Yang</i>	
Piece-wise Planar Reconstruction of Indoor Scenes Based on Laplace Depth Residuals	249
<i>Jie Yan, Jun Miao, Lei Li, Ronghua Du</i>	
Pop-up World: Synthesis of 2.5D Models Based on Monocular Images.....	255
<i>Jingyao Cai, Boyuan Cheng, Yuqian He, Zhidong Xiao, Jianjun Zhang, Xiaosong Yang</i>	
Neural Painting Based on Image Decomposition	262
<i>Yuan Ma, Zhao Wang, Meili Wang</i>	
➤ Augmented Reality and Mixed Reality	
User Experience Evaluation of AR Assisted Industrial Maintenance and Support Applications.....	270
<i>Akos Nagy, Yannis Spyridis, Gregory J. Mills, Vasileios Argyriou</i>	
Mixed Reality for Elderly Care: Ergonomic Hand Motion and AR Rehabilitation	278
<i>Xinjun Jeanne Li, Zhenhong Brad Lei</i>	
Advancing Augmented Reality at World Heritage Sites through an Affordance Lens: A Case Study of the Archaeological Ruins of Liangzhu City	284
<i>Wenyi Fan</i>	
A Vision for XR Immersion in Cricket Experience and Training	290
<i>Lionel Jayaraj, James Wood, Carlton Reeve, Edward Braund</i>	
MO-XR: Method for Observing User Interactions with XR Applications.....	296
<i>Natalia Adamczewska, Wen Tang, Zequn Li, Ethan Southall, Timothy Develin, Alberto De Caro</i>	
Advancing Manufacturing Maintenance with Mixed Reality: Integrating HoloLens 2 in the Siemens-Festo Cyber-Physical Factory.....	303
<i>Daniel Delgado-Bellamy, Zeyad Al-Shibaany, Yaseen Zaidi, Abdul Farooq</i>	
➤ Visual Perception and Environmental Simulation Based on VR	
Lulu Timeline: VR Video Timeline with Expanded Interactive Scope and Fine-tuning Function.....	312
<i>Jiaao Yu, Wenjun Hou</i>	
A Conceptual Framework of Surgical Education VR Tool Design under the Sudden Changes Perspective	323
<i>Ming Zhu, Yang Shi</i>	

Application of 360 ° Panoramic VR and Eye Tracking in the Study of Spatial Visual Perception in Traditional Chinese Gardens: A Case Study of the Humble Administrator's Garden	332
<i>Jinni Huang, Yongtao Zhang, Xingyi He, Cheng Zhang</i>	
Is VR Always a Better Choice? Investigating the Effects of Game Modes and Role-Playing on Fire Escape Simulation Training	338
<i>Zelin Jiang, Shuhao Zhang, Yue Li, Ka Lok Man, Yong Yue, Jeremy Smith</i>	
WSUS: A Novel Usability Metric Based on SUS for VR-based Tasks in Cultural Heritage Contexts	347
<i>Marco Raoul Marini, Ludovica Mocerino, Laura Leopardi, Saverio Giulio Malatesta, Luigi Cinque</i>	
Exploring Emotional Responses of Immersive VR Video Content Across Genres	356
<i>Kunyan Li, Shuxuan Yu, Chen Zuo, Yiyang Teng, Jinwu Wei, Xiaojie Wang, Ruitao Ma, Xiongwei Jia, Xiaojun Mu, Shiqi Zhao</i>	
Comparison of Two Novel Environmental Manipulation Methods for Rotating VR Users	362
<i>Linda Krueger, Charles Markham, Ralf Bierig</i>	
Dynamic Day and Night Cycle Impact in a Serious VR Game	369
<i>Fardani Annisa Damastuti, Kenan Firmansyah, Yunifa Miftachul Arif, Ali Ridho Barakbah, Mochamad Hariadi</i>	
The Facial Expression Dataset in VR Game	376
<i>Tianhua Xie, Junhuai Liang, Guohua Yang, Jingjia Deng, Weixin Zheng, Jinliang Gan</i>	
➤ Computer Aided Design and Graphic Design	
Requirements for an AI Driven Extended Reality Assistance System for Assembly Tasks.....	381
<i>Kathrin Konkol, Hannah Reusing</i>	
Touchable Colors-Research on Interactive Product Service System Based on Tactile Experience of Visually Impaired People.....	390
<i>Shuxiao Zhong, Jinjun Xia, Zhengyan Fan, Rongyu Zhang, Yuan Sun</i>	
Machine Learning-Driven Traffic Flow Prediction Using Cloud Control Big Data Analysis	396
<i>Khurram Jalil, Qian Chen, Muhammad Noaman Zahid, Fazila Jalil</i>	
A Visuo-Haptic Feedback Surgical Simulator for Twin-to-Twin Transfusion Syndrome	402
<i>Michael Kasman, Tristan Alkis, Kenneth J. Moise, Michael Bebbington, Ann Majewicz Fey</i>	
Enhancing Scoliosis Rehabilitation through Muscle Activity Visualization	412
<i>Xinyi Tang, Xuan Wu, Lakshay Sharma, Siddharth UR, Yiqi Yan, Praneeth Namburi, Brian Anthony</i>	
Improving the Immersion in VR with Real-time Full Body Performance Tracked Avatars in a Football Free-kick Simulation	421
<i>Lionel Jayaraj, James Wood, Carlton Reeve, Edward Braund</i>	
➤ Author Index	