Discovering and creating the leading edge of extended reality and spatial computing: Message from the Editor-in-Chief

Dr. med. Lars Riedemann

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Dr. med. Lars Riedemann[1] MD

[1]Department of Neurology Heidelberg University Hospital Heidelberg DE

Corresponding Author:
Dr. med. Lars Riedemann MD
Department of Neurology
Heidelberg University Hospital
Im Neuenheimer Feld 400
Heidelberg
DE

Abstract

We are pleased to introduce JMIR XR and Spatial Computing, a peer-reviewed journal dedicated to advancing the integration of extended reality (XR) and spatial computing technologies into routine clinical care.

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EDITORIAL

We are pleased to introduce JMIR XR and Spatial Computing, a peer-reviewed journal dedicated to advancing the integration of extended reality (XR) and spatial computing technologies into routine clinical care.

In navigating the frontier of XR and spatial computing for more than a decade, we adopt a stance of informed optimism tempered by vigilant caution. Based on the large number of high quality manuscripts published by JMIR publications and others over the last decades, the tremendous potential of these technologies to enhance diagnostic precision, increase treatment efficacy, facilitate an easier access to care, and improve patient outcomes, seem obvious. Yet, we remain cognizant that their integration into the healthcare ecosystem is not without peril and may take longer than many researchers and technologists have expected. We anticipate that immersive technologies will transition from novel solutions to established standards in targeted medical scenarios. However, the intricate integrations in the complex healthcare system and the widespread acceptance by healthcare workers will not happen overnight. Not unlike other established technologies, adoption will slowly develop in a stepwise process based on rigorous, basic and translational research and development.

XR and spatial computing are rather old concepts, dating back to at least the late 1960, and became visible to the scientific community through iconic works such as Ivan Sutherland's *The Sword of Damocles* (**Sutherland**) In June 2003, Simon Greenwold at the Massachusetts Institute of Technology described “spatial computing” in his thesis as a “human interaction with a machine in which the machine retains and manipulates referents to real objects and spaces”. Inspired by prior researchers and technologists he foresaw that “the augmentation of a data network with a physical network promotes the flow of digital information on top of existing social interactions”.

When JMIR Publications launched in 1999, the widespread adoption of XR and spatial computing in clinical settings was hard to imagine. Fast forward to today, and we find ourselves at the cusp of an era where XR and spatial computing are poised to integrate into routine clinical care. This shift has been propelled by a confluence of recent technological advancements. The rapid AI evolution [Haug], particularly breakthroughs in computer vision, has significantly improved spatial mapping and 3D scene understanding. Furthermore, AI has revolutionised programming code and 3D content creation. Exponential improvements in graphical processing capabilities [Garisto] have been complemented by significant advances in lightweight, energy-efficient display technologies [Xiong], and the advent of high-bandwidth and low latency network has significantly enhanced connectivity. Additionally, a drop in overall purchase prices for XR technology and the increasing popularity in the consumer space continue to reduce adoption of XR and spatial computing.

The tangible impact of these developments in healthcare is evident. For instance, the authors of the German guideline for treating anxiety disorders [Bandelow] recommend virtual reality exposure therapy as a viable alternative when *in vivo* exposure is not feasible for patients with spider, height, or flight phobias. This example illustrates the growing acceptance of immersive technologies in clinical practice as "another arrow in the quiver" of healthcare.

However, our optimism is tempered with pragmatism. While XR and spatial computing offer promising avenues for enhancing healthcare delivery, we recognize that they are not universal solutions. The successful integration of these technologies into existing healthcare systems and workflows requires thoughtful consideration and careful implementation. Their true effectiveness will be determined by the appropriateness of their application, the specific contexts in which they are deployed, a significantly positive cost-benefit ratio, and most importantly, their demonstrable ability to improve patient outcomes or enhance healthcare efficiency [Selaskowski]. As we move forward, it is crucial to approach the adoption of these technologies with a balanced perspective, ensuring that their integration complements and enhances, rather than disrupts the foundational aspects of quality healthcare delivery.

Therefore, we encourage authors from both academia and industry to view JMIR XR and Spatial Computing as a platform for showcasing their collaborative efforts, sharing insights, and contributing to the responsible advancement of immersive technologies in healthcare.

Our journal recognizes the critical importance of addressing the accessibility and equity challenges surrounding XR and spatial computing technologies. We strongly encourage the community to submit manuscripts exploring innovative solutions to these pressing issues. We are particularly interested in studies on cost-effective technology implementations in resource-limited settings, strategies for overcoming infrastructure barriers in underserved areas. Additionally, we welcome submissions proposing novel approaches to making XR and spatial computing technologies more accessible and affordable, as well as policy recommendations for promoting equitable access to this emerging technology. By fostering dialogue and research in this area, we aim to ensure that the transformative potential of XR and spatial computing technologies benefits all segments of society.

Central to our vision is the belief in the power of strong industrial-academic collaborations. Therefore, we actively encourage and facilitate partnerships between academic researchers and industry innovators. These collaborations bridge the gap between theoretical research and practical application, accelerating the development of cutting-edge XR and spatial computing solutions while ensuring they meet rigorous scientific standards. Furthermore, we invite independent, non-academic developers and designers as well as open-source project contributors of all kinds to communicate their perspectives with us. We believe that the transparency and accessibility of open-source development can significantly accelerate progress in XR and spatial computing applications for healthcare.

By embracing contributions from this diverse range of sources - academic-industry collaborations, individual innovators, and open-source communities - we aim to foster a rich ecosystem of ideas and developments that will shape the future of XR and spatial computing in healthcare.

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