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Efficient VR-AR communication method using virtual replicas in XR remote collaboration

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Abstract

Aims: This article aims to create a taxonomy of evidence-based medical eXtended Reality (MXR) applications, including Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), and 360-degree photo/video technologies, to identify best practices for designing and evaluating user experiences and interfaces (UX/UI). The goal is to assist researchers, developers, and practitioners in comparing and extrapolating the best solutions for high-precision MXR tools in medical and wellness contexts.

Methods: To develop the taxonomy, a review of medical and MXR publications was conducted, followed by three systematic mapping studies. Applications were categorized by end-users and purposes. The first mapping cross-referenced digital health technology classifications. The second validated the structure by incorporating over 350 evidence-based MXR apps, with input from twenty XR-HCI researchers. The third, ongoing mapping adds emerging apps, refining the taxonomy further.

Results: The taxonomy is presented in a dynamic database and 3D interactive graph, allowing international researchers to visualize and discuss developed evidence-based medical and wellness XR applications. This formalizes prior efforts to distinguish validated MXR solutions from speculative ones.

Conclusion: The taxonomy focuses solely on evidence-based applications, highlighting areas where VR, AR, and MR have been successfully implemented. It serves as a tool for stakeholders to analyze and understand best practices in MXR design, promoting the development of safe, effective, and user-friendly medical and wellness applications.

Keywords: MXR, evidence-based, taxonomy, high-dexterity, high-precision; high-empathy

1 Introduction

American English is desirable. Abbreviations should be spelled out when first used. If non-English words are used,

2 Major Headings

Major headings should be typeset in boldface, with each initial letter of individual word should be capitalized (see example above).



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$$A = \pi r^2 \tag{3.1}$$

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$$\begin{aligned} A &= \pi r^2 \\ &= \frac{1}{4} \pi d^2 \end{aligned} \tag{3.2}$$

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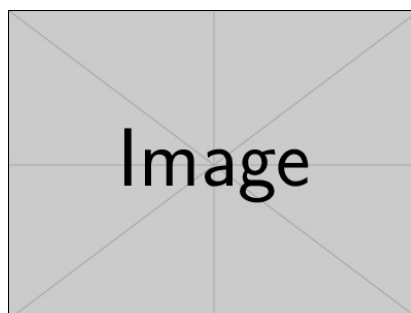


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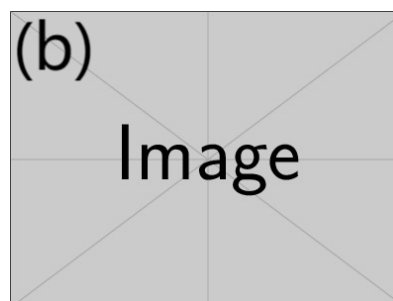


Figure 2. Insert brief title. (a) description of panel a. (b) description of panel b.

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2 multiplication table	
2×2	4
3×2	6
4×2	8

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Supplementary materials

The supplementary material for this article is available at: [URL](#).

Declarations

Acknowledgements

The acknowledgements section appears just before the references. This is the optional section where the authors could credit others for their guidance or help in writing the manuscript. Funding sources or sponsorship information may be included here too.

Authors contribution

Single author;

The author contributed solely to the article.

Two or more authors:

Made substantial contributions to conception and design of the study and performed data analysis and interpretation;

Salas H, Castaneda WV;

Performed data acquisition, as well as provided administrative, technical, and material support: Castillo N, Young V

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9 References

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$$A = \pi r^2 \tag{A.1}$$

A.1.1 This is the sub-subappendix

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$$A = \pi r^2 \tag{B.1}$$

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