Review protocol for:

"A Typology of Virtual Reality Locomotion Techniques"

Costas Boletsis, SINTEF Digital
Dimitra Chasanidou, University of Oslo – TIK Centre

Rationale

Conduct a systematic literature review to document VR locomotion techniques and assess if they fit under the proposed VR locomotion typology of Boletsis (2017), thus investigating the typology's consistency.

The systematic literature review should follow the review protocol/methodology of Boletsis (2017) so that methodological consistency and, thus, result comparability between the two studies is achieved. The replication of the methodology of Boletsis (2017) can ensure that the results regarding the typology and VR locomotion's current state-of-the-art are not skewed or affected by some methodological differences between studies.

Review question

To what degree can recently studied VR locomotion techniques be classified under the proposed VR locomotion typology of Boletsis (2017)? Which VR locomotion techniques have been studied recently? Which are the interaction-related characteristics of the recently studied VR locomotion techniques?

Information sources

Scopus database (scopus.com) for the main search.
Scopus, Google Scholar, Web of Science for backward reference searching.

Search strategy

Focus on the 2021 publication year because: we need up-to-date research to evaluate the typology's consistency and, based on pilot literature searches that took place while preparing this protocol, 2021 can produce a study sample of similar size to that of Boletsis (2017) that produced the original typology.

We replicate the search strategy of Boletsis (2017), and we also use the same keywords, since they are still applicable here. The keywords come from trial searches using various combinations of search terms, derived from breaking down the research questions into individual facets i.e. population, intervention, outcomes, study designs. Then, drew up a list of synonyms, abbreviations, and alternative spellings. Preliminary searches aimed at identifying existing theoretical works in the field and re-use the terms used there were also conducted. Sophisticated search strings were then constructed using Boolean AND's and OR's.

The Scopus database ensures that the most respectable sources are being searched for the necessary related articles. Therefore, the Scopus database advanced-search query string for the main search is:

ABS (("locomotion" OR "navigation technique") AND ("empirical" OR "studied" OR "study" OR "evaluation" OR "evaluate" OR "examination" OR "examine") AND ("virtual reality" OR "virtual environment" OR "virtual world")) AND (LIMIT-TO (PUBYEAR,2021))

Backward reference searching to run general searches of specific references and to identify relevant articles will be conducted.

Eligibility criteria
For articles to be included in the review, they must:

- be peer-reviewed articles,
- published between January 2021 and December 2021,
- written in English,
- including at least one VR locomotion technique,
- including a user study which examines direct or indirect aspects of the VR locomotion technique(s),
- having a fully-immersive VR setup, utilising Head-Mounted Displays (HMDs).

Data management
All retrieved articles (included and excluded) will be downloaded as PDFs and distributed between the two reviewers, using a local storage option (USB stick).

Screening process
Two reviewers will screen all retrieved articles (full text). There will be two review rounds. Then, backward reference searching will follow. The categories of the review will be those of Boletsis (2017) and, specifically, those who concern the typology. The studies of the included articles will not be evaluated as to their quality. They will only be evaluated as to their empirical natural in a binary way (empirical or not empirical study), so that the satisfaction of the inclusion criterion is examined. Based on the RQs, the quality of these studies is not within the scope of this review. At every step of the screening process, the agreement between the reviewers will be calculated and, at the final validation exercise, inter-rater agreement should be more than 80%. Any disagreements should be settled.

Data collection
Both reviewers will perform the data extraction process. Based on the categories of Boletsis (2017), the data extracted from each article will be: the full reference, the description and title of the VR locomotion technique(s), the interaction aspects of the VR locomotion technique(s) (e.g. interaction type, movement type, VR interaction space, devices, et al.). In the event data are missing, the study authors will be contacted.

Prioritization
The data that concern the consistency of the typology will be prioritized (based on the RQs). Data regarding the general status of the VR locomotion field will follow and they will be presented as additional, side-material.

Data analysis
Data will be presented on a concept matrix using the categories formed at the Boletsis (2017) review, which are also related to our RQs. Categories will represent the typology of Boletsis (2017). If data do not fit in these categories, special symbols like “–“, “N/A”, or “?” will be used to visualize the difference.

Contact details

Costas Boletsis - konstantinos.boletsis@sintef.no
Dimitra Chasanidou - dimitra.chasanidou@tik.uio.no

Anticipated start - finish date of review
6 January 2022 - 30 April 2022

Review protocol's version
Version 1: submitted 17 December 2021

REFERENCES

Boletsis, C. (2017). The new era of virtual reality locomotion: A systematic literature review of techniques and a proposed typology. *Multimodal Technologies and Interaction*, *1*(4), 24.