

BACKGROUND

Cybersickness severely hinders the immersive experience in Virtual Reality

Despite the technological advancements in Virtual Reality (VR), users are constantly combating feelings of nausea and disorientation, the so called **cybersickness**¹.

Cybersickness is likely caused by a **sensory conflict between visuo-vestibular information** about the body's orientation and self motion².

Research has mainly focused on visuo-vestibular conflicts triggered by VR environments in which vestibular signals are *absent*. That is, when VR users feel the sensation of travelling through a virtual environment, while actually remaining stationary in the real world. Little is known on visuo-vestibular conflicts in VR scenarios in which the user is allowed to move, such as in **360-degree VR**.

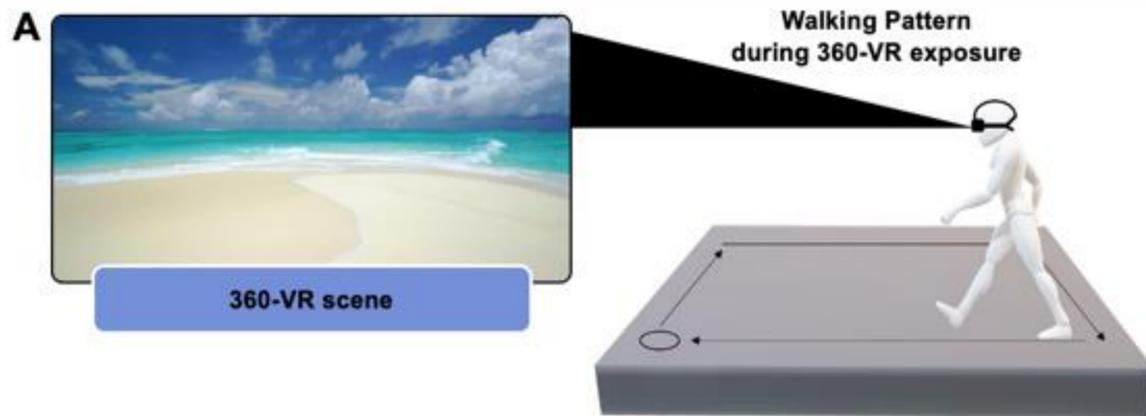
360-degree VR

Movement in the real physical world is not reflected in the VR world. 360-degree VR supports only 3-degree-of-freedom rotational motion (not translational motion).

VIRTUAL REALITY SCENARIO

Participants viewed a virtual beach environment while walking in a square pattern in standard360-VR and copernic360-VR

360-VR Experimental Set-Up



AIM OF THE STUDY

To explore the cybersickness profile in settings where there are minimal dynamic visual inputs combined with translational vestibular inputs.

To evaluate the effectiveness of a new AI-based software in reducing cybersickness.

THE AI SOLUTION: COPERNIC360

Developed by Kagenova (<https://kagenova.com/products/copernic360/>) to provide 6DOF and reduce sensory conflict.

Simulates 6DOF artificial motion to reduce cybersickness by minimising visuo-vestibular conflict.

MEASURING CYBERSICKNESS

EXPLICIT MEASURES:

- SIMULATOR SICKNESS QUESTIONNAIRE (SSQ):** Participants were asked to report intensity of feelings across 16 symptoms on a four point scale. Symptoms of **NAUSEA, OCULOMOTOR DISRUBANCE** and **DISORIENTATION** were measured.
- FAST MOTION SICKNESS SCORE (0-20)** measured before, during and after VR exposure.

IMPLICIT MEASURES:

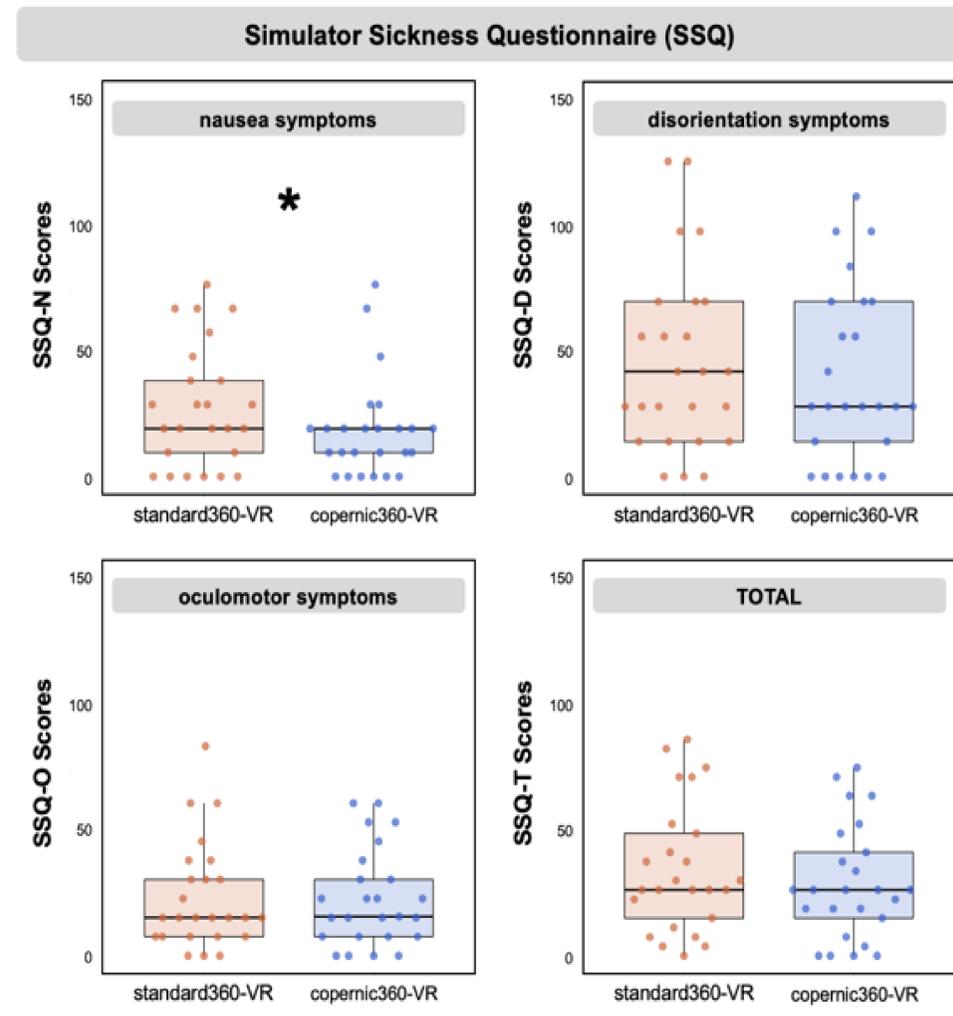
Heart Rate measured before, during and after VR exposure.

Conclusion

AI supplemented VR can help reduce feelings of NAUSEA typically associated with cybersickness
Congruency between VESTIBULAR and VISUAL cues in 360-degree VR provides an immersive and engaging VR experience

Questions? Please get in touch! Iqra.Arshad.2016@live.rhul.ac.uk

Standard360-VR v Copernic360-VR: SSQ



Simulator sickness scores showed a significant reduction in feelings of nausea ($t(24) = 2.17, p = .04, \text{Cohen's } d = 0.44$) between the standard360-VR and copernic360-VR conditions.

Fewer nausea-related symptoms were reported in the COPERNIC360-VR compared to STANDARD-VR

No significant differences between standard360-VR and copernic360-VR for Disorientation and Oculomotor symptoms.

No significant differences were found in implicit measures between standard360-VR and copernic360-VR conditions.

References:

- LaViola, J. J. (2000). A discussion of cybersickness in virtual environments. *ACM SIGCHI Bulletin*, 32(1), 47-56.
- Gallagher, M., and Ferré, E. R. (2018). Cybersickness: A Multisensory Integration Perspective. In *Multisensory Research*