

Proprioceptive VR HCI

Thesis Recap/Overview

- Explore proprioception-oriented VR HCI
- Exploration is done through the form of a VR video game
 - Test data shows that calibration algorithm can improve proprioceptive accuracy
 - Test different game mechanics to reveal insights for proprioceptive VR HCI
- Design insights and guidelines are generated from the exploration

Presentation Topics and Reasoning

- Design game mechanics that require the players to consciously engage with their proprioception – This is essential for the project development as it is a video game, but the paper is not about designing proprioceptive game mechanics.
- Example proprioceptive UI designs to improve the current GUI-dominant VR UI design patterns – This can show the immediate benefit of incorporating proprioceptive UI elements to the current VR UI design space, but including these examples will require extra research, development, and testing, making the thesis's scope too large.

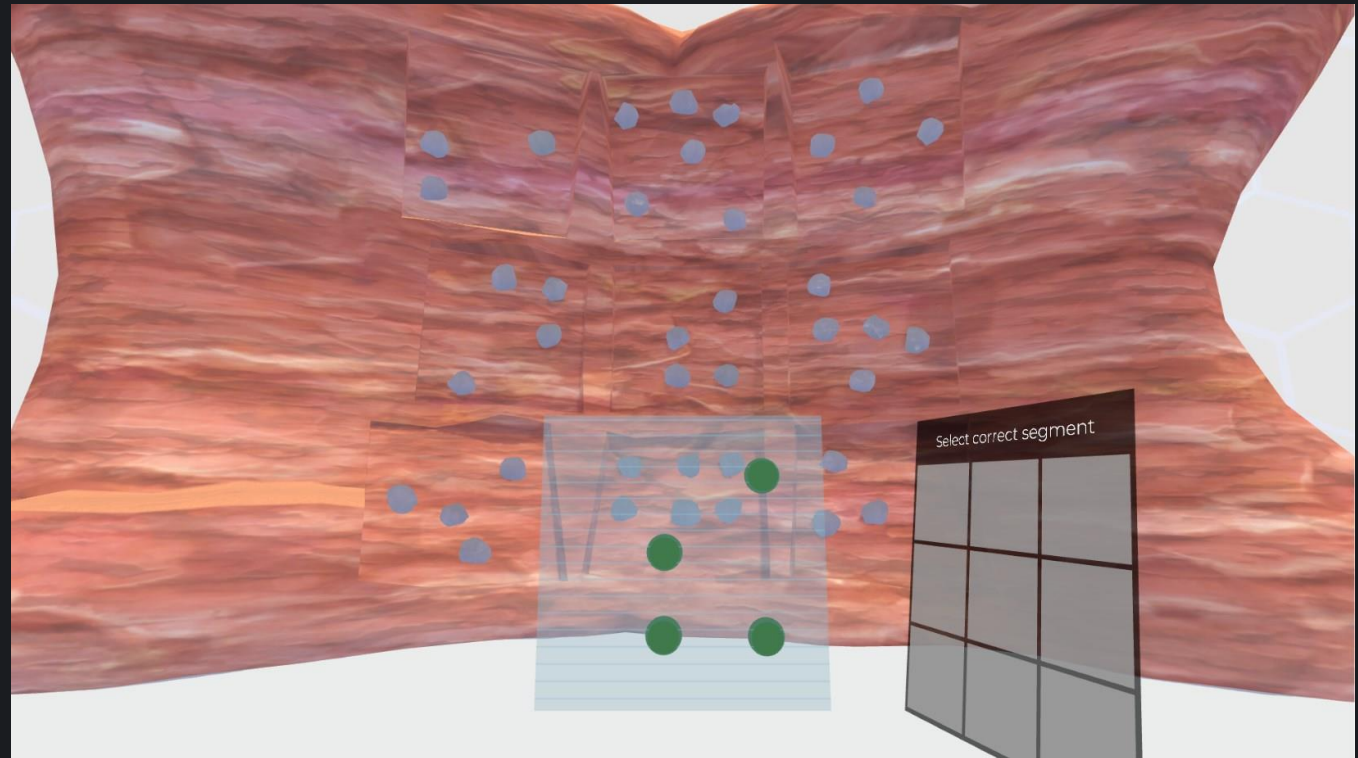
Design Proprioception-Aware Game Mechanics

- Perceiving external information through proprioception
- Target/direction-reaching physical movement guided by proprioception
- Proprioceptively perceive body attachments

Perceiving External Information Through Proprioception

When the player try to gather game information through proprioceptively perceived hand position, they will be more aware of their proprioception.

Visual elements can foster the use of proprioception for objective-oriented perception of external information.



Proprioceptive Target/Direction-Reaching Hand Movement

Avoid the passive use of proprioception in hand-eye coordination by shifting the player perspective from first to third-person.

Objective information is visually acquired and internalized, then proprioception is used to guide the body movement to complete the objective.



Proprioceptively Perceive Body Attachments

Attaching external (foreign) objects to the player's body parts (hand) will require the player to be proprioceptively aware of the extension of their body. The player's proprioception need to perceive the object extended out of their hand.

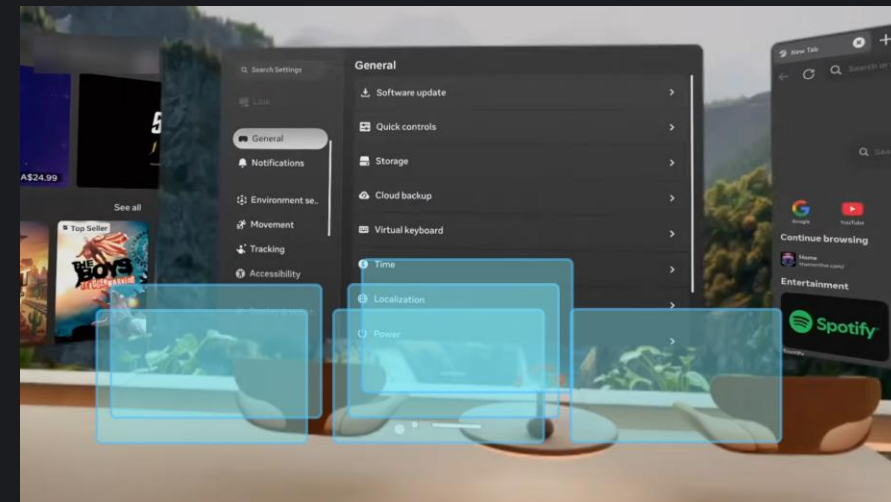
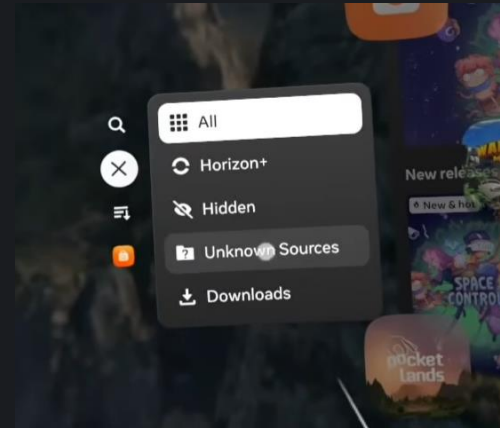


Proprioceptive VR UI Design Examples

- Core concept: the proprioceptive UI space in VR applications can be seen as a "parallel space" to the GUI space. Proprioceptive UI elements don't need to obstruct GUI elements, and vice versa. GUI's operating space is mostly 2D while proprioceptive UI's operating space can be 3D.
- Examples will be given based on the current version of Meta Quest's operating system.

Menu Navigation and App Window Management

- Menu navigation – The latest version has a vertical menu with small icons which is difficult to navigate for some users. Instead use the common pointer-style navigation, it can be navigated through proprioceptive UI.
- Application window management – Like on a flat screen, users can open multiple windows in Meta Quest's operating system. And like on a flatscreen, users can only manage them in a 2D plane. Proprioceptive UI can let user manage the windows in a 3D space, stacking them in the depth direction.



Thank You