



Creating a Realistic and Immersive Virtual Reality Environment Capturing the Relaxing Properties of Nature

Description

Nature has numerous health benefits and has been prescribed to relax and reduce stress, aptly called by some as a “Nature Pill”. Thus, it is important to have access to nature, but there can be restricting factors such as distance or mobility impairments. Virtual nature is a substitute that provides these benefits, and we created a multisensory virtual forest environment that incorporates the best environmental designs to maximise relaxation.

Goals

- Find the best design to incorporate the 4 **senses** of sight, hearing, smell, and touch (using **physical props**)
- Create a virtual environment with realistic **elements** that maximise relaxation
- Find the best **locomotion** technique that maximises immersion and minimizes cyber sickness
- Efficiency**: have good frame rates and low latency

The success of our project was measured through heuristic evaluation and rendering performance.

Senses



Lush forest, blue sky, calm river, distant waterfall



Water flowing sounds, songbirds, and teleportation feedback sounds



Forest scent, petrichor, undergrowth



Using physical props: a branch and a bench

Physical Props

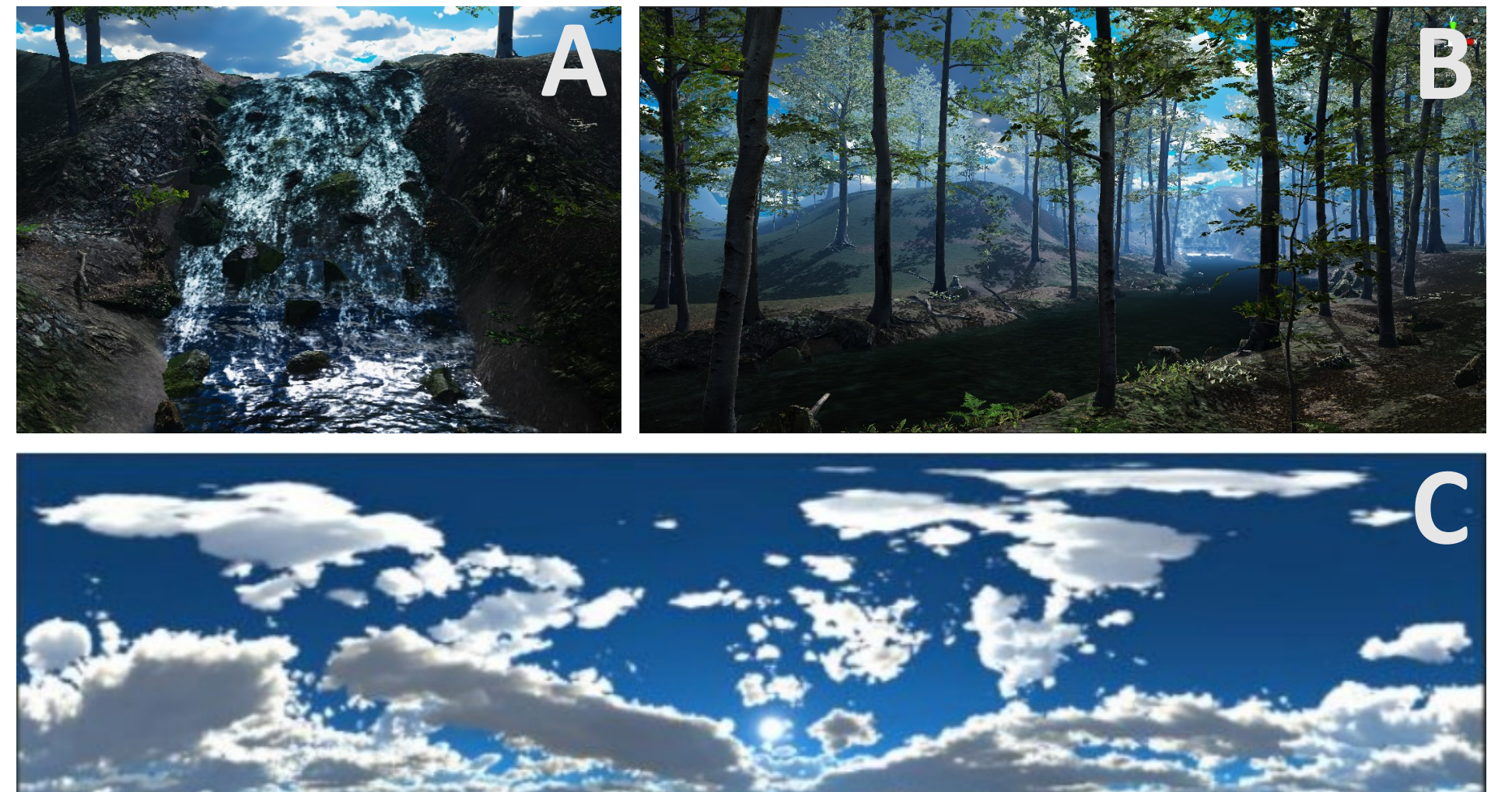
A bench and a branch need to be mapped to the models created in the virtual world. This mapping was done using HTC Vive Trackers to track object positions and orientations.



The player in the room looking towards the bench with attached tracker (A) and what they would see if they were aligned with the bench in the virtual world (B) or not (C). The real branch (D) and its virtual representation (E).

Environment Elements

To create a realistic environment, we incorporated a waterfall, river, terrain height variations, trees and plants, debris, an interactable bench and branch, sky with clouds, sun, natural lighting, fog, and wind. Below the images of the waterfall (A), river (B) and sky (C) can be seen.



Locomotion

To advance beyond the bounds of the physical room, users can teleport to a new point in the scene, or swing their arms to mimic walking. Users are also able to use the branch prop to spawn the teleportation arc.



Efficiency

Maximising realism is ideal. However, as graphics quality improves, computation time increases, resulting in lower frame rates. This is bad for the experience of the user and can cause cybersickness. Existing research suggests maintaining frame rates above the 50 fps at which point some users experience cybersickness. Our environment renders with 67 fps on average. Latency associated with the controller was unnoticeable.

