VR engine performance comparison.

Create identical scenes in both Unity VR and Unreal VR and compare how well the applications perform (using FPS as the main measure of performance) when rendering high amounts of identical models.  
**Independent variables:** count of objects in scene, engine used

**Dependent variables:** fps, CPU usage, GPU usage

**Controlled variables:** triangle count on mesh, texture on mesh, programs running the background, hardware used; Headset: Oculus Quest 2

# Justification

One of the goals of VR is to allow the user to fully immerse themselves in the application used. However, using a VR headset is known to cause discomfort and motion sickness – dizziness, nausea, headaches etc. 60+ fps is preferable in any game, traditional games with frame rates as low as 30 fps are still considered playable, while according to researched conducted by Chen Zhang, it seems that low framerates drastically increase the likelihood of experiencing discomfort in VR. Any frame rate below 60 fps is much less comfortable, with frame rates below 50 fps being especially bad.

Meta still as the highest VR market share, even if it decreased in 2023, and according to Steam as of February 2024 40% of users use Meta Quest 2, which can be used as a standalone headset.

For these reasons, I intend to investigate at what point each engine starts to underperform and where is the bottleneck exactly (GPU, CPU, memory?), when running the program directly on the VR headset, as opposed to it being connected to a PC via Steam VR or similar. I will then provide recommendations for handling large number of objects in both engines.

Sources:

“Steam Hardware & Software Survey: February 2024.” Steam, 2024, store.steampowered.com/hwsurvey/Steam-Hardware-Software-Survey-Welcome-to-Steam.

“VR Headsets: Global XR (AR & VR) Headsets Market Share.” Counterpoint, www.counterpointresearch.com/insights/global-xr-ar-vr-headsets-market-share/. Accessed 13 Mar. 2024.

Zhang, Chen. “Investigation on motion sickness in virtual reality environment from the perspective of User Experience.” 2020 IEEE 3rd International Conference on Information Systems and Computer Aided Education (ICISCAE), 27 Sept. 2020, https://doi.org/10.1109/iciscae51034.2020.9236907.