New open-source software aims to reduce cybersickness in VR use

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Cybersickness, or motion sickness during the use of virtual reality, can be a major roadblock to the development and adoption of augmented and virtual reality technology. Now researchers at UTSA have built

GingerVR, the first open-source Unity software tool kit that allows developers to use proven techniques and innovative solutions against cybersickness in future extended reality environments.

"GingerVR can be applied to any Unity application, be it a game, enterprise application or job training," said John Quarles, an associate professor in the Department of Computer Science who along with Ph.D. student Samuel Ang developed the tool kit.

XR is a catchall phrase for the next-level digital content that tech companies like Microsoft, Samsung, Apple, Google and Facebook deploy in smart phones and, in some cases, directly onto users' faces. Within the gaming industry, extended reality is seen as the third pillar of entertainment.

Although Unity leads in the AR and VR game development sector, it has shifted toward business-to-business applications. Companies such as Unity plan to move beyond gaming to develop applications for architecture, engineering and construction use. A survey by the firm Forrester Consulting has shown that one in two of companies in these industries plan to incorporate extended reality within the next two years.

It's an accelerated transition from the currently reported 19% adoption rate among firms. This means that the future workforce will have to learn quickly how to navigate these XR environments, where the virtual seamlessly blends with the real and vice versa.

"Cybersickness is a threat to the overall user acceptance of VR, which has a potentially huge impact on the VR industry. The negative symptoms experienced by a user can decrease human performance, limit learning and hinder decision making," said Quarles. "It has been a problem in VR since the creation of the technology and is still not totally understood as to why it occurs and in whom."

The percentage of individuals who suffer from cybersickeness side effects is hard to pinpoint. According to Quarles, the research literature indicates that more than half of users experience symptoms but with a wide range of severity.

"Some users can habituate over time, while others could just put on a headset and have to pull it off. They just can't handle it," said Quarles. "We just don't know why there are those individual differences. Our goal is to make the technology available to the widest possible audience," he added.

Ginger VR, was named after the plant which is known to be an antidote for nausea—one of the classic symptoms of cybersickness. Other negative effects of these new environments include disorientation or fatigue.

Recently the AR/VR industry led by Unity, Google, Microsoft and other major players in the space created a consortium known as OpenXR. The foundation focuses on making AR/VR software to agree on a general framework and integrate any headset without having to write new code across platforms. Yet, according to Quarles, OpenXR doesn't necessarily address the cybersickness gap, which GingerVR does meet.

The software tool kit implements eight cybersickness reduction techniques in Unity. These solutions are packaged in an open-source repository along with tutorials for ease of integration. As a result, these techniques are now simple to add and don't depend on other [software packages](#) outside of what already comes with a default Unity project.

Researchers from around the world are often creating new reduction techniques, which can easily be integrated into GingerVR. Quarles along with Ang is currently working on releasing an integrated automated, real-time cybersickness detection, prediction and reduction framework on the

GingerVR toolkit.

"We hope that this package will serve as a shortcut to researchers looking to utilize these techniques and develop a better understanding of why they are effective," said Quarles. "In the future we hope to update this Unity package with additional cybersickness reduction techniques as they appear in the literature and improve existing assets based on user feedback."

Professor Quarles' previous work on cybersickness has been supported by Intel. The Ginger VR software tool kit was funded by the National Science Foundation and presented at the 2020 IEEE Conference on Virtual Reality and 3-D User Interfaces Abstracts and Workshops.

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