

Abstract

Augmented reality (AR)/mixed reality (MR) technology is a technology that can integrate virtual feature information with the real world. Its wide application provides users with a new way to obtain additional information, such as using AR applications to observe the internal structure information of the medical human body model. However, in this implementation process, it is easy to make users confused about the spatial relationship between the virtual object and the real object. That is, the perceived depth of an AR object deviates from the intended depth and cannot achieve the effect that the AR object appears inside the real object. This problem is also called lack of depth perception. For improving the depth perception in AR, the existing related literature mainly conducts research and experiments from three directions: translucent projection objects, creating virtual interior space of occlusion objects, and enriching depth cues. After the comparison, the construction of the virtual interior space method has the most effective depth perception between them.

But even so, some current excellent research methods still have some shortcomings. For example, the virtual item may obscure the characteristic information of the real environment, and the shader programming language they used is relatively basic and not easy to extend in the future. Therefore, the main purpose of the project is to use a new custom shader method to achieve the excellent cut-away effect in the previous paper and to enrich the depth clues of the scene on this basis. I used the C++ custom shader programming method in Unity to reimplement and improve some of the cut-away effects. The project mainly uses two different Render Pipeline rendering methods based on the Built-in Render Pipeline and Universal Render Pipeline in Unity to achieve the effect. Through the comparison and analysis of the two experimental results, it is found that the cut-away effect of the Built-in Render Pipeline is currently the most real and effective. It can easily allow users to perceive the correct spatial relationship between objects. The main contribution of this dissertation is using the Unity engine to achieve the cut-away effect. It improves the user's perceived spatial relationships between real objects and projected MR objects, and also provides some custom cut-away feature options for users to freely adjust. The implementation based on the Unity engine makes the project easier to introduce into other AR applications, furthermore, it also facilitates the later function expansion.

Keywords: Augmented reality; Spatial perception; Custom shading; Cut-away