Master Thesis

Improving Users´ Depth Perception in Mixed Reality

Mixed Reality (MR) gives the experience of having virtual objects within the real-world. AR lets users study a virtual object and interact with it. Furthermore, MR puts virtual objects into the spatial context of the user´s environment. This works only when the user can estimate the distance to the virtual object and make distance comparisons to real world objects. In other words, the user must have a three dimensional perception of the mixed reality. When i.e., objects that need to be rendered behind a particular object, instead appear in front of it, causes incorrect depth ordering. The ability to perceive a scene as three dimensional is due to depth perception. Depth perception arises from a variety of depth cues. Incorporating visual effects that emulate depth cues i.e. cast shadows or shape-from-shading can enhance the illusion of a three dimensional virtual object in spatial context. However, synthetic depth cues are not implemented to common MR applications.

Figure 1: How far away is the virtual bird? Image from Engell (2018)

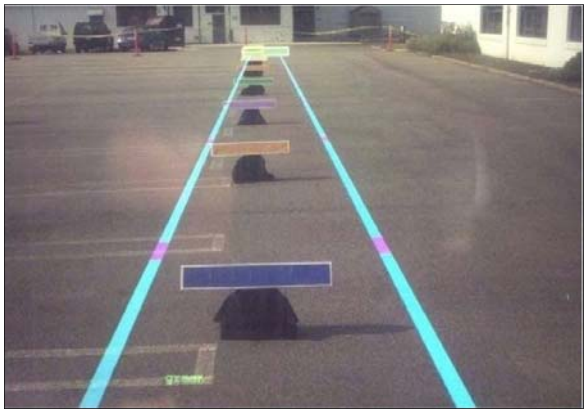

Figure 2: Implementing Linear Perspective Cues, U.S Naval. Research

This thesis aims to incorporate visual effects to facilitate depth perception in Mixed Reality (MR). Suitable depth cues are to be determined and then implemented as visual effects into a simple MR navigation application on a test circuit. The AR application is to be designed for the Microsoft HoloLens. Many spatial cues can be implemented that help humans perceive distances and locations better. This thesis should focus on incorporating visual effects to facilitate depth perception for wayfinding symbols. The structural design of wayfinding symbols can build on preceding Master Theses that deal with HoloLens navigation applications. The effectiveness of the implemented depth cues is to be evaluated within a user test.

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