

Real-Time Foveation in a Head-Mounted Display

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The human eye's visual acuity is greatest in a region near the centre of the retina known as the *fovea* and decreases continuously towards the periphery. *Foveation* is the process of simulating this variable-resolution effect on image sequences in a gaze-contingent manner [1]. If the resolution map used in the foveation is matched to the resolution distribution of the human eye, the observer cannot detect the manipulation.

Foveation has typically been used to reduce the bandwidth required for video transmission or to improve the perceived video quality at a certain bandwidth [2]. Our work, however, focuses on the guidance of eye movements [3], and so we are interested in the effect that foveation has on the observer's eye movements. Indeed, we have been able to show that eye movements are influenced by an extension of the foveation effect that manipulates not only spatial, but also temporal resolution [4]. Furthermore, if the strength of the effect is kept below a certain threshold, it is not detected by the observer [5].

Ultimately, we want to incorporate gaze guidance technology into mobile applications; such technology, integrated into a head-mounted display (HMD), could use computer vision techniques to enhance human visual performance. We will demonstrate a first implementation of such a device in the form of a system that implements real-time foveation in an HMD with video-see-through.

References

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