

A See-Through Near-Eye Display for Presbyopia

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We propose a compact design of see-through near-eye display (NED) [1-3] that is dedicated to presbyopia. Our solution is characterized by a plano-convex waveguide, which is essentially an integration of a corrective lens and two volume holograms. Its design rules are set forth in detail, followed by the results and discussion regarding the field of view (FOV), modulation transfer function (MTF), distortion, and simulated imaging.

Figure 1 is a schematic drawing of the proposed monocular see-through NED, which mainly consists of two components, *i.e.* a pico projector and a plano-convex waveguide. Figure 2 shows the imaging simulation that takes into account the effects of distortion, aberration blurring, diffraction blurring, and relative illumination for both real and virtual images. Based on the simulation, its key performance including FOV, MTF, and distortion has been studied. For real image, FOV is 137° (diagonal), MTF is above 0.4 at 66 cycles/mm, and distortion is less than 0.15%. For virtual image, FOV is 61° (diagonal), MTF is above 0.4 at 36 cycles/mm, and distortion is less than 3.90%.

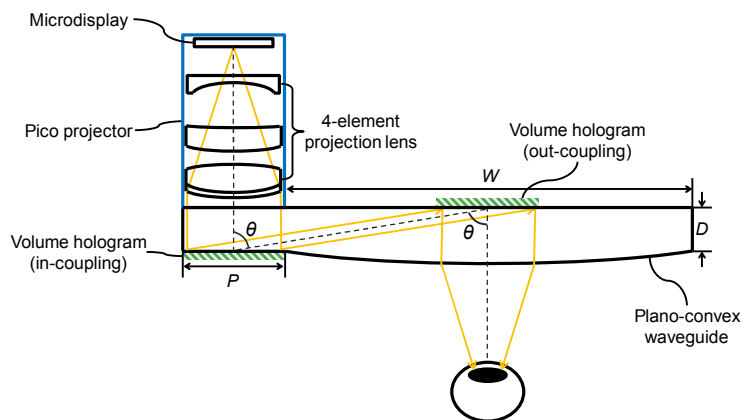


Fig. 1. Schematic drawing of the proposed monocular see-through NED

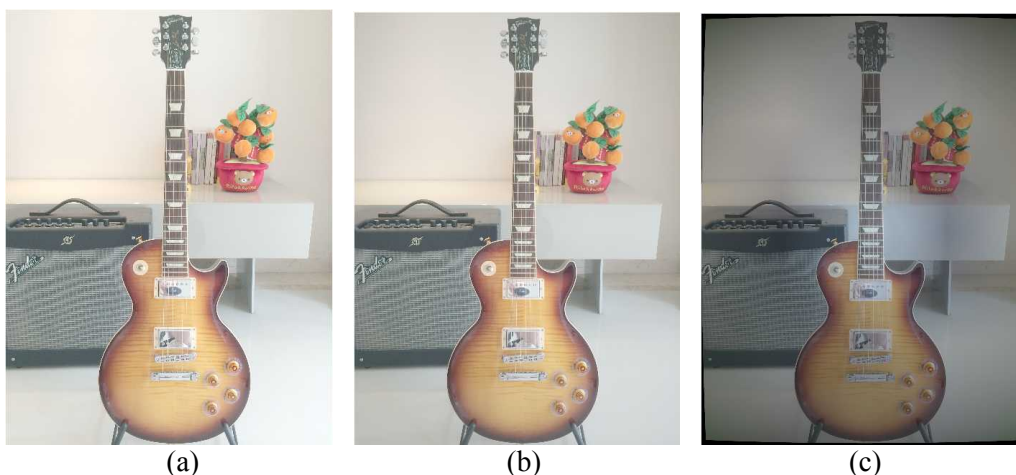


Fig. 2. Imaging simulation of (a) original, (b) real, and (c) virtual images.

References

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3. C. P. Chen, Y. Wu, and H. Jin, CN Patent no. 201710192142.6 (2017).