



Design and evaluation of near eye display with freeform optics

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Freeform optics, mixed with other new technologies, continue to push the frontier of head-worn displays for virtual reality and augmented reality, and deliver systems with high optical performance, better user experience, and low production cost. Due to the excellent aberration correction ability of freeform surface, the extremely simple, single-mirror HWD is feasible. An FOV as large as 90° is achieved in commercial HWDs of this form. By making the freeform element thin and half mirror, optical see-through (OST) for AR can be realized. Another compact form of HWD is the freeform prism (FFP). This single-piece HWD developed in BIT has a FOV of 53° , an exit-pupil diameter of 8mm, and a weight of 6 grams, whereas a conventional HWD with comparative parameters may need 6 elements and weigh more than 50 grams. Besides the advantages of lightweight and compactness, FFP can be easily used as an AR HWD with an additional compensation lens.

SHORT BIO:

Dewen Cheng received his B.S. degree in optics from Beijing Institute of Technology, China in 2004, and the Ph.D degree from Beijing Institute of Technology and University of Arizona in 2011. He is currently a Professor at School of Optics and Photonics, Beijing Institute of Technology. He received the Outstanding Young funding from Natural Science Foundation of China (NSFC) in 2018. His research interests include optical design, 3D display, virtual reality (VR) and augmented reality technologies and applications, especially on near-eye display and freeform optics, light field display.