Advances and Applications of AR Near-Eye Display Technology

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Augmented Reality (AR) is widely regarded as the next generation of mobile terminals and computing platforms, with near-eye display systems being the optimal mode of presentation. These systems have seen rapid development in recent years, becoming a fiercely competitive field at the forefront of global science and technology. The optical parameters of AR near-eye display systems have a direct impact on user experience and comfort, which are critical to the product's success. The micro display devices and optical systems significantly influence the development of these terminals. This report will elaborate on the performance requirements and classifications of AR near-eye display optics, analyze the scientific challenges and bottlenecks encountered in the development of lighter and more compact systems, introduce the latest research progress made by Beijing Institute of Technology in the areas of free-form surface high-definition, ultra-thin geometric waveguide, and ultra-light holographic waveguide AR display optical systems, and list multiple successful application examples. Finally, the report will provide an outlook on the development trends of AR near-eye displays.

Short Bio:

Dewen Cheng received his PhD degree in Beijing Institute of Technology (BIT), China. He is a professor and doctoral supervisor of BIT, CEO of Beijing Nedplus Display Technology Company. His research focuses on the design of freeform optical systems, virtual reality (VR) and augmented reality (AR) head-mounted display (HMD) technology, and optometry. He has undertaken more than ten projects under the Ministry of Science and Technology's key R&D program, applied for over 200 patents, including more than 20 in Europe and America, and published over 100 academic papers. His achievements including the First Prize for Innovative Technology from the Optical Engineering Society in 2017, the First Prize for Beijing Technical Invention in 2019, the

Personal Award for the Innovative Achievement of Industry-University-Research Cooperation in China in 2020, and the China Patent Excellence Award from the National Intellectual Property Administration in 2022.