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Sommario/riassunto

This book presents recent advances in three-dimensional (3D) imaging and display frameworks, encompassing three categories of 3D imaging and display technologies. The first category is nonphotorealistic 3D approaches based on conventional optical cameras to implement 3D stereoscopic observation of a scene. In the context of nonphotorealistic 3D imaging and reconstruction systems, the authors introduce general principles and also demonstrate camera calibration for 3D imaging, smart cameras, and full-link imaging methods using the optical modulation transfer function to improve imaging quality in conventional cameras. The second category is based on light-ray light field technology to achieve photorealistic 3D imaging and displays. In the context of light-ray light field systems, two approaches capable of light-ray light field 3D imaging by utilizing a camera array or a lens array are demonstrated. Accordingly, light-ray light field display approaches comprising head-mounted displays and integral displays are also introduced. The third category is also photorealistic 3D imaging and display technology, which is based on holography (i.e., diffraction or wavefront light field). In the corresponding holographic displays, the authors introduce 3D holographic displays from three elements: algorithms, devices, and systems, involving fast hologram generation algorithms, wide-viewing-angle display systems, and metasurface holography, etc. Including an investigative roadmap for future progress in optical imaging and 3D display systems, this book is essential reading for scientists and engineers in academia and industry who are interested in next-generation imaging and display concepts for 3D visual sensing systems.