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成像技术与图像处理

基于相机实拍的高分辨集成成像三维显示技术的研究

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摘要： 为了实现高分辨率集成成像三维显示，设计了一种基于数码相机实拍的综合成像高分辨率图像采集系统，给出3D图像的深度范围；对实、虚显示模式的图像分辨率进行分析研究。基于集成成像原理用数码相机进行高分辨率的图像采集，由微透镜阵列节距、焦距、物距等参数计算出显示分辨率与显示深度，结合计算机进行图像处理，通过高精度打印图像并与微透镜阵列粘合的方法进行实验验证，给出拍摄参数和显示参数并与传统视差显示模式和集成成像的聚焦显示模式进行比较。在参数匹配较好的情况下，集成成像实、虚显示模式的图像分辨率优于聚焦显示模式和传统视差显示模式，并可采用较宽节距的微透镜阵列，验证了集成成像实、虚显示模式下可实现高分辨率的三维显示。通过集成成像高分辨率图像采集，并以实模式、虚模式显示模式，可获得高分辨率的集成成像三维显示。

关键词： 集成成像 三维显示 高分辨率 实模式 虚模式

High resolution D display technology of integral imaging based on photographic

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Abstract: In order to achieve high-resolution 3D integral imaging, an integrated imaging system is designed based on high-resolution image capture by the digital camera arrays and reproduced by the microlens arrays. The resolutions of the integral imaging on real/virtual display modes and display depth is analyzed. Based on the integrated imaging principle, a digital camera is used for high resolution image acquisition. The display resolution and depth are calculated according to the microlens array pitch, focal length, object distance and other parameters. After image processing, the image is printed with high precision. Then the image and the microlens array are glued together. The shooting parameters and display parameters are given. The image contrasts are compared between the traditional parallax display mode and the focus display mode of integrated imaging. In the case of parameters match well, the high-resolution 3D displays are achieved. The resolution of the images, which is near by the central depth plane of real/virtual display mode, can achieve the best. The experimental results prove that the image display effects are excellent in the depth range, the resolution of the real/virtual display mode is much better than that of the focus mode and the traditional multi-view free stereo display, which is based on the parallax principle.

Keywords: integral imaging three-dimensional display high resolution real display mode virtual display mode

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