机械工程

摄像机成像过程仿真技术研究

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摘要：

探讨并比较了理想摄像机成像的过程与OpenGL透视投影的机理,从理论角度证明了通过设定OpenGL参数可使其渲染图像与真实摄像机拍摄结果一致。编程实现摄像机成像仿真平台,预先设定摄像机的内外参数,由OpenGL渲染生成不同位置的Checkerboard图像,利用第三方标定程序包进行标定。标定结果与预先设定的摄像机参数一致,证明了理论推导的正确性。通过本系统可以深入了解摄像机理想状态下成像的基本过程,且该模拟方法可摈除无关因素的干扰。为视觉系统标定、立体匹配、畸变校正、动态识别等大部分视觉算法的仿真奠定了基础。

关键词： 摄像机　OpenGL　成像仿真　透视投影

Research on camera imaging simulation technology

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Abstract:

Imaging essence was studied and compared between OpenGL and a real camera, which proved that the rendering result of OpenGL was in theory in accordance with imagery of a real camera. A camera imaging simulation platform was built to get the check board image by previously setting the intrinsic parameters, then the parameters of a virtual camera was computed with a calibration toolbox. Experimental results showed that two sets of parameter were nearly the same, which indirectly proves the theory right. It was learned that the process of camera imaging by the platform was without disturbance coming from any other elements. The theory and system can be used to verify the algorithm in a vision system such as calibration, stereo match, and distortion rectification.

Keywords: camera　OpenGL　imaging simulation　perspective projection

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