Summary: This paper presents a novel 3D depth information extraction method without calibration. Firstly, this paper develops an omni-directional 3D camera system, which consists of a CCD camera, hyperbolic mirror, infrared laser diodes and diffractive of element (DOE). Secondly, a depth measurement model is proposed to obtain the 3D depth information. Finally, in order to calculate the speckle shift accurately between the reference image and the object image, a dot matrix pattern and sequence coding algorithm are designed to find the corresponding speckles in the two images. Experimental results show that the reconstructed depth data have a good correlation with the actual distance. The accuracy of the data is also found to be influenced by the distance between the object and the camera.

Keywords: depth measurement; omni-directional image; structured light; infrared laser; real-time systems

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