

結構光3D視覺系統之校正

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摘要

In the paper the CCD camera, laser projector and high precision X-Y-Z translation stage were used to form a Structured light based vision system to obtain the 3D data of an object surface. The CCD camera, dot target and X-Y-Z translation stage were used to accurately determine the position of the circle dots on the dot target so that a world coordinate system was erected and a set of calibration points were obtained. The camera was then calibrated to extract 15 camera parameters. Due to the use of a specially arranged dot array, the laser projector calibration may be conducted once the camera calibration is completed to get the equation of the structured light stripe plane relative to the world coordinate system. After the calibration of camera and laser projector, the 3D surface of an object may be reconstructed relative to the world coordinate system by using the 2D image points on the structured light stripe. The dot target was moved with some distance along the direction of the principal ray of the camera to evaluate the baseline measurement error of the proposed system. Results indicate that the baseline system measurement error in depth direction is within 2~3 μm .

關鍵字 : CCD camera, Laser projector, Structured light stripe system, Projector calibration, Error evaluation