

# Hybrid calibration method for improving 3D measurement accuracy of structured light systems

## Abstract

In structured-light systems, the lens distortions of the camera and the projector reduce the measurement accuracy when calibrated as a standard stereo-vision system. The conventional compensation via distortion coefficients reduces the error, but still leaves a significant residual. Recently, we proposed a hybrid calibration procedure that leverages the standard calibration approach to improve measurement accuracy. This hybrid procedure consisted of building a pixel-wise phase-to-coordinate mapping based on adjusted 3D data obtained from the standard stereo-vision method. Here, we show experimentally that the measurement accuracy can be significantly improved, even using the linear pinhole model and linear mapping functions. We then move to consider the nonlinear model to improve the measurement accuracy further. Encouraging results show that this new calibration method increases the measurement accuracy without requiring elaborate calibration procedures or sophisticated ancillary equipment.