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An easy calibration for oblique-viewing endoscopes

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Abstract

Oblique-viewing endoscopes (oblique scopes) are widely used in minimally invasive surgery. The viewing direction of an oblique endoscope can be changed by rotating the scope cylinder, which enables a larger field of view, but makes the scope calibration process more difficult. The calibration is a critical step for incorporating oblique scope into computer assisted surgical procedures (robotics, navigation, augmented reality), though few calibration methods of oblique endoscopes has been developed. Yamaguchi et al. [1] first modelled and calibrated the oblique scope. They directly tracked the camera head and formulated the scope cylinder's rotation to the camera model as an extrinsic parameter. Their method requires five additional parameters to be estimated. In this work, we track the scope cylinder instead. Since the rotation of the camera head with respect to the cylinder only causes the rotation of the image plane, less parameter needs to be estimated. Experiments demonstrate the ease, simplicity and accuracy of our method.

Notes

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Text Reference

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