GEOCAL

Geometric camera calibration

GEOCAL is a geometric camera calibration device that uses a beam expanded laser in combination with a diffractive optical element (DOE). This device introduces a new dimension in geometric camera calibration.

Main Features

✳ Create a regular grid of light spots from infinity

✳ Camera position is translation invariant*

✳ Easily manage the angle of camera rotation

✳ No relay lens required

✳ A very compact design

✳ Calibrate large field-of-view cameras

✳ Stereo camera alignments and adjustments

The importance of geometric calibration

Geometric calibration is essential for camera systems that rely on detecting objects in a moving scene, e.g., ADAS or security camera systems. A geometrically calibrated camera will be able to measure distances more accurately, detect objects, compensate for high levels of distortion, and align stereo camera pairs.

Laser diode   Collimator   DOE

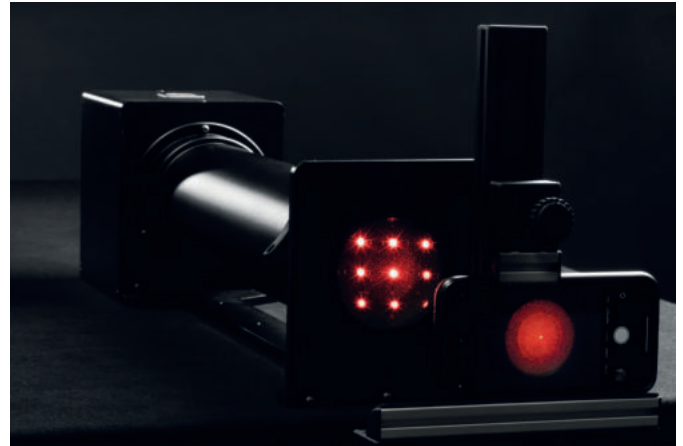Camera under test
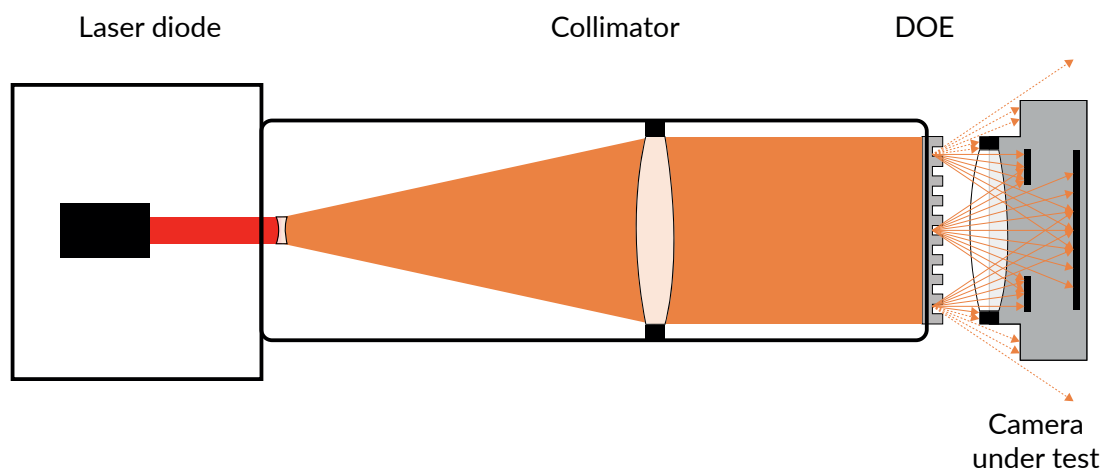
An example of how the GEOCAL functions

*To a certain extent.

GEOCAL evaluation software

GEOCAL has a standalone software with a GUI interface for evaluating test results. An API is also available for those wishing to apply the solution to custom software.

GEOCAL software distortion curve

A mobile phone under test

Why GEOCAL over traditional geometric calibration methods?

Traditional geometric calibration methods rely on test charts with regular patterns, but these patterns need to be scaled depending on the field of view and the intended object distance. As a result, relay lenses must be utilized for accurate calibration, but these lenses cannot calibrate from infinity. GEOCAL, however, is a compact device that avoids using relay lenses and test charts altogether while calibrating from infinity and thereby improving the accuracy of the calibration.

At a Glance	GEOCAL
Principle	DOE-based geometric calibration of digital cameras
Light source	Frequency-stabilized diode laser
Wavelength	632.8 nm
Diffractive optical element (DOE)	Generates a very evenly distributed point grid of 71x71 points (continued by higher diffraction orders), virtually originating from infinity
Output window	Usable aperture: Ø 75 mm (camera lens needs to have an equal or smaller diameter)
Usable FoV	Approx. 30 – 120° (more extreme values still need to be tested)
Software system requirements	PC with Windows 7 operating system (or higher) USB port
Functions	• Load multiple images • View selected image • Perform calibration • Overlay detected point grid • Distortion visualization (graph) • Export results (CSV and XML)