# 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

✱ Measure distortion, focal length, principle point

✱ Calibrate large field-of-view cameras

✱ Stereo camera alignments and adjustments

✱ IR option available

API AVAILABLE
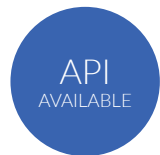
The importance of geometric calibration

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.

GEOCAL XL

The GEOCAL XL is ideal for geometric calibration of cameras with large front lenses and in instances where the distance between the camera and GEOCAL needs to be large (e.g., calibrating through a windshield). The IR version expands the laser diode wavelength range to 935 nm for geometric camera calibrations in the NIR region.

Laser diode   Collimator   DOE

Camera under test
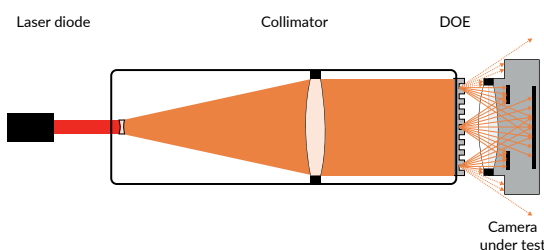
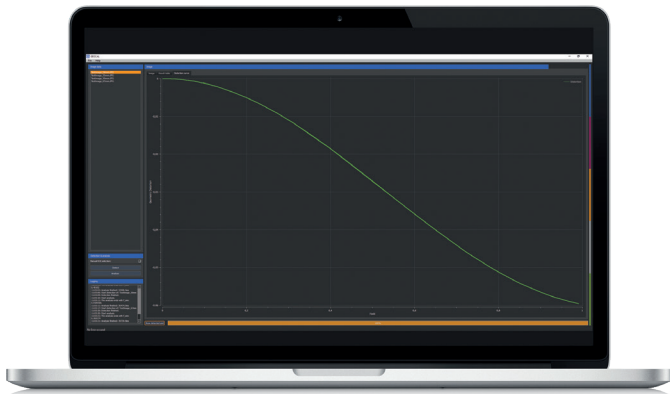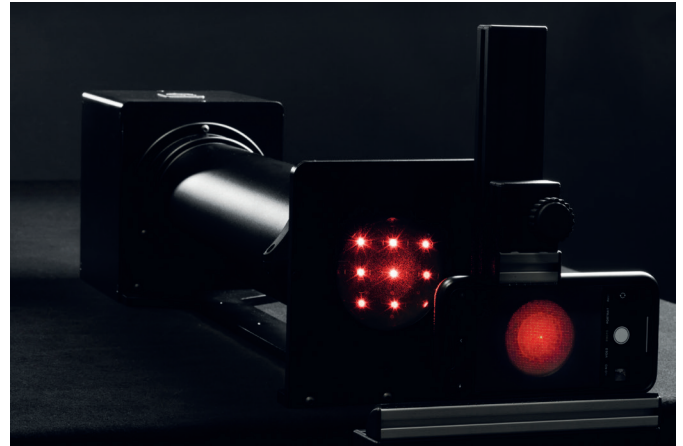An example of how the GEOCAL functions

GEOCAL XL

*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 / GEOCAL XL / GEOCAL IR
Principle	DOE-based geometric calibration of digital cameras
Light source	Frequency-stabilized diode laser
Wavelength	**GEOCAL / GEOCAL XL**: 633 nm **GEOCAL IR**: 935 nm
Diffractive optical element (DOE)	Generates a very evenly distributed grid of light points, virtually originating from infinity
Output window	**GEOCAL / GEOCAL IR**: Usable aperture: Ø 77 mm **GEOCAL XL**: Usable aperture: Ø 155 mm (camera lens needs to have an equal or smaller diameter)
Usable FoV	Approx. 30° – 120° (Larger values possible, depending on the camera. Please contact us for details)
Software system requirements	PC with Windows 10 operating system (or higher)
Functions	• Load multiple images • View selected image • Perform calibration • Overlay detected point grid • Various result visualization methods • Export results (CSV and XML) and coordinates of detected points (CSV)