GEOCAL - FAQ

FAQ

Why did you develop GEOCAL? (What does it do?)
We saw a need for a compact optical device that can perform a fast calibration of camera-lens combinations to characterize and digitally remove geometric distortion. GEOCAL can also provide the camera's angular orientation (extrinsic) useful for aligning two cameras together.

What is the accuracy?
We have achieved at least the accuracy level of conventional test-chart-based measurements. GEOCAL also provides the outer (angular) orientation, which can't be measured with traditional methods.

How good is repeatability?
The repeatability has shown to be very reliable.

What is the device-to-device variation?
We currently do not see a risk for significant device-to-device variation. Quantization is still ongoing.

In the case of calibrating stereo pairs, how long can the stereo base be?
This case depends on the diameter of the DOE (Diffractive Optical Element) and the diameter of the camera's entrance pupil. We currently expect a stereo base of 60 mm for cameras with small lenses for the first GEOCAL device and much larger ones for future devices with larger beam diameters.

How large can the camera's field of view be?
So far, we guarantee up to 140°. The ability to support fisheye lenses with even greater fields of view has been proven in a case study but still needs to be implemented in the software.

Can the wavelength of the laser be modified?
It may be possible to select a laser with a different wavelength, but the laser and the DOE work as a system, and therefore a change in one component needs to be verified in the other. Thus, we start with 633 nm, which is an excellent choice to bridge visible and IR wavelengths to each other. It currently is unlikely that we will find a laser diode in the green and blue range.

What is the limit of the distortion model?
We are using rotationally symmetric distortion models, mainly the ones based on open CV. In some cases, e.g., for cameras behind a windshield, this model may not work accurately. Therefore, we are investigating other models that may be more appropriate in some applications.

What is the uniformity of the illumination?
We are working with a DOE and a standard frequency-stabilized laser. This combination creates some variation in the uniformity. But we keep the uniformity high enough to achieve good geometric measurement results within most cameras' dynamic range.

Do you offer evaluation software for GEOCAL?
Yes, we do. We offer standalone software with a GUI interface and have an API available.

What about eye safety?
We are using a low-power laser diode with an expanded laser beam, and we even reduce its power to get to reasonable exposure times with the devices under test. As long as the housing is not opened and the users do not use magnifiers to look into the beam, GEOCAL will not compromise eye safety.

Can GEOCAL be used in a production environment?
Yes. With our experience building hardware for production, we see GEOCAL being useful in development labs and on the production floor, performing geometric calibrations and alignment for a wide variety of cameras.

What are the advantages of the GEOCAL API?
The GEOCAL API allows you to implement GEOCAL functionality into your applications, such as daily workflow software, production line solutions, or device testing applications.

Can the number of dots in the camera sensor be adjusted?
The number of visible dots in the image depends on the field of view. The design of the standard DOE is for 20° - 140° field of views. Please contact us if your application is outside of this range.

Why do we use red light dots instead of white?
We use red light dots because we need monochromatic light. White light consists of different spectra, and, at this time, the only available stabilized laser that uses

monochromatic light has a red wavelength. The red wavelength is also the lowest available wavelength.