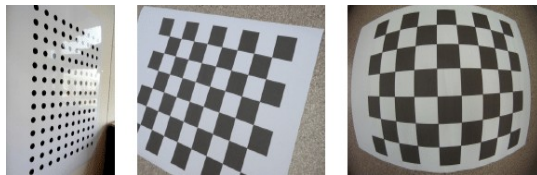


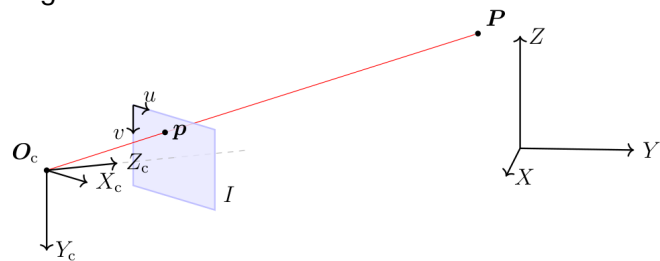
## Proposal for a research internship on *Evaluation of Camera Calibration Techniques*

Modern computer vision applications, e.g., 3D reconstruction, measurement, robotics, or multi-view processing, stand and fall with the accuracy of the foregoing camera calibration. The result of the calibration directly influences the relation between image pixels and the geometry of the recorded scene, thus it must be as accurate as possible.

Typically, the calibration process estimates the camera-specific parameters of a given model, such as pin-hole, or fisheye. Parameters of interest are, for example, focal length, pixel aspect ratio, optical center, lens distortion, etc. Only a well-estimated model describes reasonable relation between the scene and the resulting image.



Images of different calibration patterns.



Geometric relations between camera and world coordinates.

The typical process of *photogrammetry calibration* (i.e. using a calibration object) consists of control point locating, followed by a pose estimation of the calibration object, and estimation of internal camera parameters according to the image projection of the located control points. Moreover, iterative methods can provide additional refinement. Intensive research in the recent years has brought up a large amount of calibration techniques, improvements, and elaborate procedures and models, depending on the application.

The goal of this internship is to find out the most potent approaches to the steps above and to evaluate their advantages and disadvantages under well-defined test conditions.

The tasks of this work include:

- Literature research and selection of the most promising techniques
- Creating plausible and meaningful test conditions
- Simulation of the chosen approaches
- Evaluation of the accuracy and error robustness

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**Prerequisites:** Matlab and/or C++ programming

**Available:** Immediately