3D Computer Vision
Homework: Hands-on Camera Calibration

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Objective

Capture a few images of a planar calibration target and run a full intrinsic calibration (OpenCV). **All code, printed values, and figures must appear in your PDF, similar to the notebook style in the reference.**

Data and Tools

Take **5–10** images of a checkerboard at different poses. Use Python + OpenCV/NumPy.

1. **Corner Detection**
   Detect and **draw** the checkerboard corners on *one* image. **Paste the image here.** Also print/paste:

   - pattern size (e.g. `(7,6)`)
   - square size (e.g. `0.025 m`)
   - number of successful detections

2. **Calibration**
   Run `cv2.calibrateCamera`. **Paste the raw outputs:**

   - camera matrix K
   - distortion coeffs $(k_1, k_2, p_1, p_2[, k_3])$
   - mean reprojection error

   Keep the exact numeric format from Python.

3. **Undistortion**
   Using the estimated intrinsics, undistort one input image. **Paste original and undistorted images side by side.** Add 2–3 sentences on what improved.

4. **Reprojection Check**
   Project the calibration board corners back to the image using the view's R, t. **Paste the overlay figure** (detected vs. reprojected). In 2 sentences, say whether they align and one likely error source.

Submission

Submit **one PDF (max 1 page if images are small)** containing: all figures, the printed Python outputs, and short comments. Also submit your `.py` or notebook. **Do not link to external results — show them in the PDF.**