EE 417 Computer Vision
Assignment # 1
Camera Calibration
(Due: December 2, 2022, Time: 23:55)

1. We have covered the camera calibration method from the camera projection matrix in class.

   Do the followings:

   - Create a precise calibration rig (3D calibration object). To do this, print two identical checkerboard patterns in a good laser printer and post them onto the orthogonal planes (You may consider two orthogonal sides of a rectangular/square box or two walls of your room!). Make sure that you can easily associate a world coordinate system with the calibration rig and determine the metric (in mm) world coordinates of all the corner points on the rig (both planes) using simple geometry and/or trigonometry.

   - Take an off-the-shelf camera. You can use any kind of camera you wish. Take one image of the calibration rig and extract corners with the following methods:

        i.   Harris corner detection
        ii. Intersections of Hough lines

   - You should use a sufficient number of corner points (e.g. 30-50 points from both planes) in order to increase the accuracy of the parameter estimation.

   - Calibrate your camera using the calibration method from the camera projection matrix covered in class.

   - Explore Camera Calibration Toolbox for Matlab in the following link:

        http://www.vision.caltech.edu/bouguetj/calib_doc/

        and calibrate your camera using this toolbox.

2. Discuss your results, comment on the performance of each method and compare them.

Note: You can submit your reports through SUCourse as a single pdf document which contains all the explanations, resulting images, comments/discussions, and MATLAB source codes.