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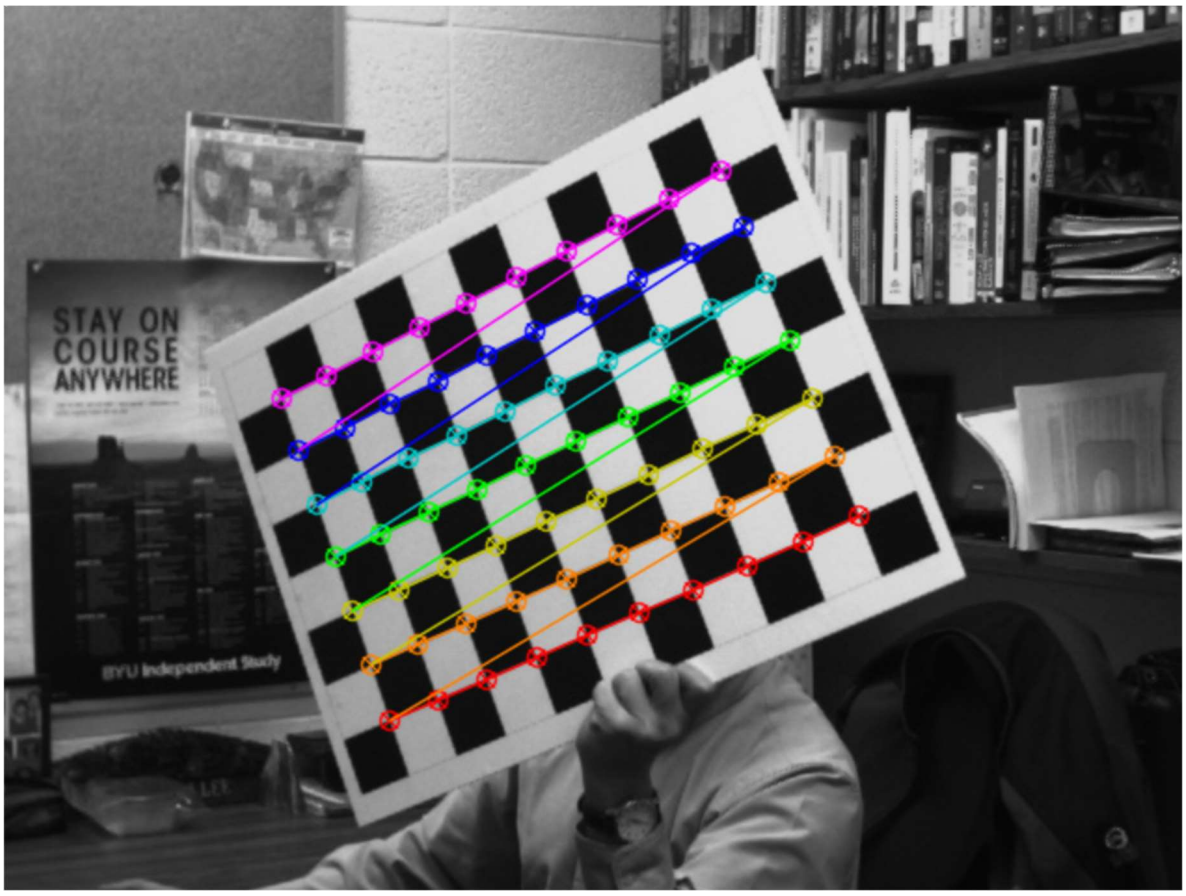
EC EN 631

1 February 2025

Task 1



Here is a colorized version of the corners found using the OpenCV functions. It appears to have done very well.

Task 2

Focal Length: 8.485mm and 8.47mm were the calculations given in the intrinsic parameter matrix (after being transformed from pixels to mm, using the formula provided in class), which likely means that it is an **8.5 mm** lens

The intrinsic parameters are given by the matrix:

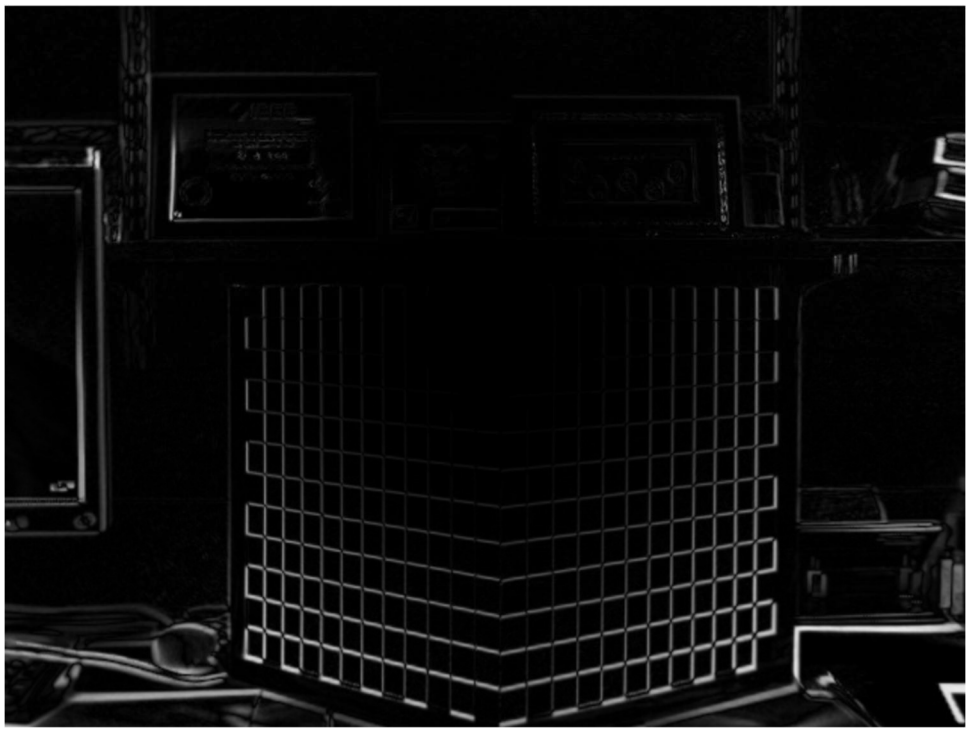
$$\begin{bmatrix} 1{,}145.48 & 0 & 328.20 \\ 0 & 1{,}143.86 & 222.29 \\ 0 & 0 & 1 \end{bmatrix}$$

The distortion parameters are:

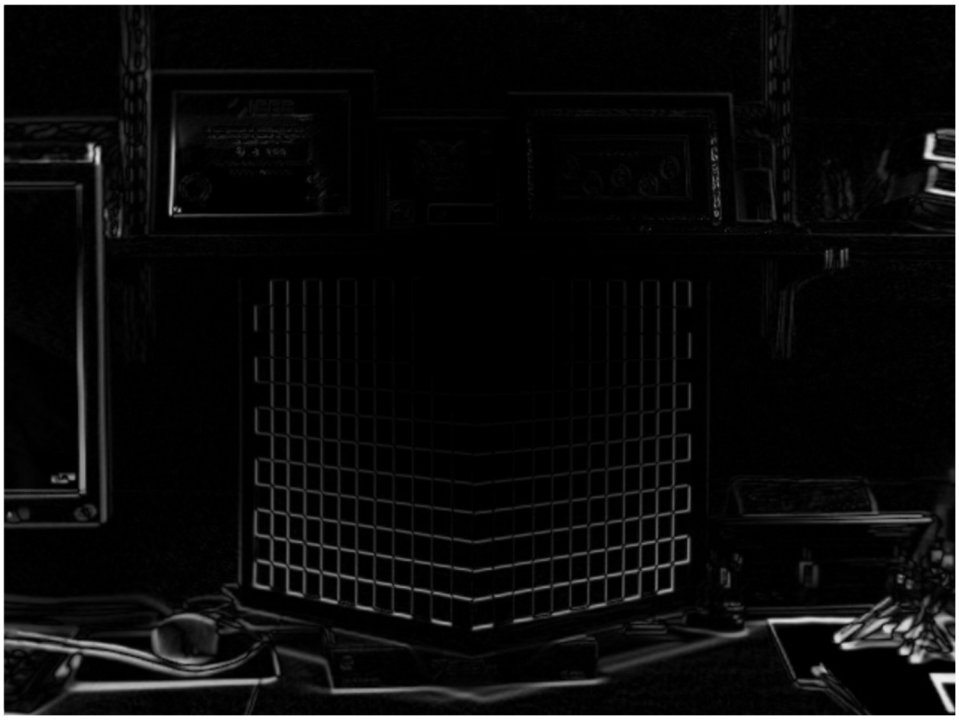
$$\begin{bmatrix} -0.2570 \\ 0.01737 \\ -0.00135 \\ -0.00143 \\ 2.0352 \end{bmatrix}$$

Task 3

Close Image Difference (see next page):



Far Image Difference:



Turned Image Difference:

Task 4

The rotation vector, (angles used to get the rotation matrix) is given by:

$$\begin{bmatrix} 1.5141 \\ -0.5794 \\ 0.5877 \end{bmatrix}$$

The rotation matrix, R, is given by:

$$\begin{bmatrix} 0.7359 & -0.6770 & 0.0131 \\ -0.0033 & -0.0229 & -0.9997 \\ 0.6771 & 0.7356 & -0.0191 \end{bmatrix}$$

The transition vector, T, is given by:

$$\begin{bmatrix} 0.00588 \\ 1.04822 \\ 4.66948 \end{bmatrix}$$

Task 5

Focal Length: 4.95mm and 4.74mm were the calculations given in the intrinsic parameter matrix (after being transformed from pixels to mm, using the formula provided in class), which likely means that it is somewhere around a **4.8 mm** lens. This is, of course, assuming that my camera has similar specs to the Point Grey Flea2 used in task 2.

The intrinsic parameters are given by the matrix:

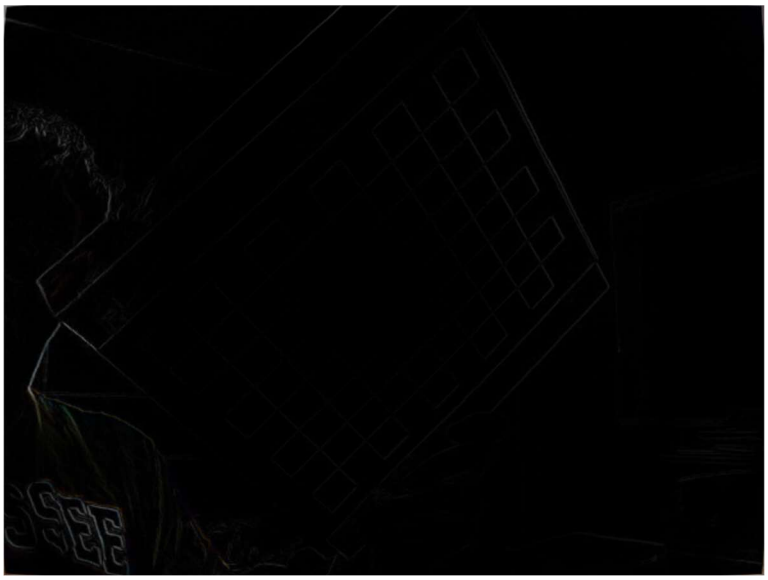
$$\begin{bmatrix} 667.804 & 0 & 326.097 \\ 0 & 639.903 & 245.018 \\ 0 & 0 & 1 \end{bmatrix}$$

The distortion parameters are:

$$\begin{bmatrix} 0.08087 \\ -0.99228 \\ -0.00010 \\ 0.00203 \\ 2.50649 \end{bmatrix}$$

Task 6

Below are the absolute differences after removing the distortions for three different images taken from my camera.



It appears that my camera did a better job accounting for these distortions when taking the photo (or it just had less in general). The absolute differences are minimal and only really show up on the edges of the image.