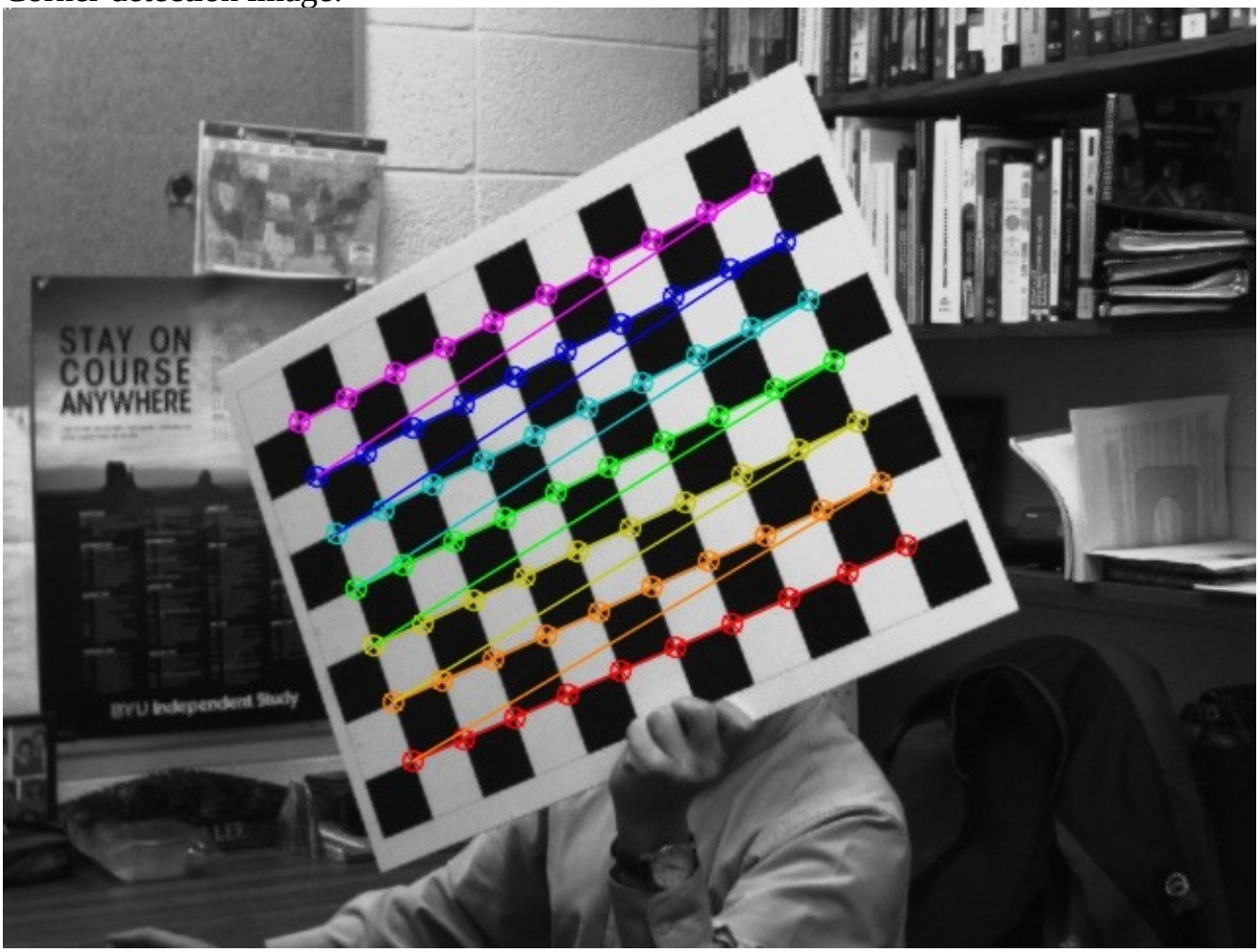
ECEn 631 Camera Calibration & Distortion Correction – HW 2
Seth Nielsen

Task 1

Corner detection image:



This is an image where OpenCV’s findChessboardCorners() and drawChessboardCorners() functions were used to detect and circle the inner corners of a chessboard.

Task 2

Intrinsic parameters:
[[1145.8, 0, 328.5],
 [0, 1144.2, 222.3],
 [0, 0, 1]]

Distortion parameters:
[-0.256, -0.0235, -0.00139, -0.00140, 2.14]

Focal length:
Assuming an 8.5 mm lens, a 7.4 µm x 7.4 µm pixel size, and a 648x488 pixel CMOS sensor, the focal length will be:

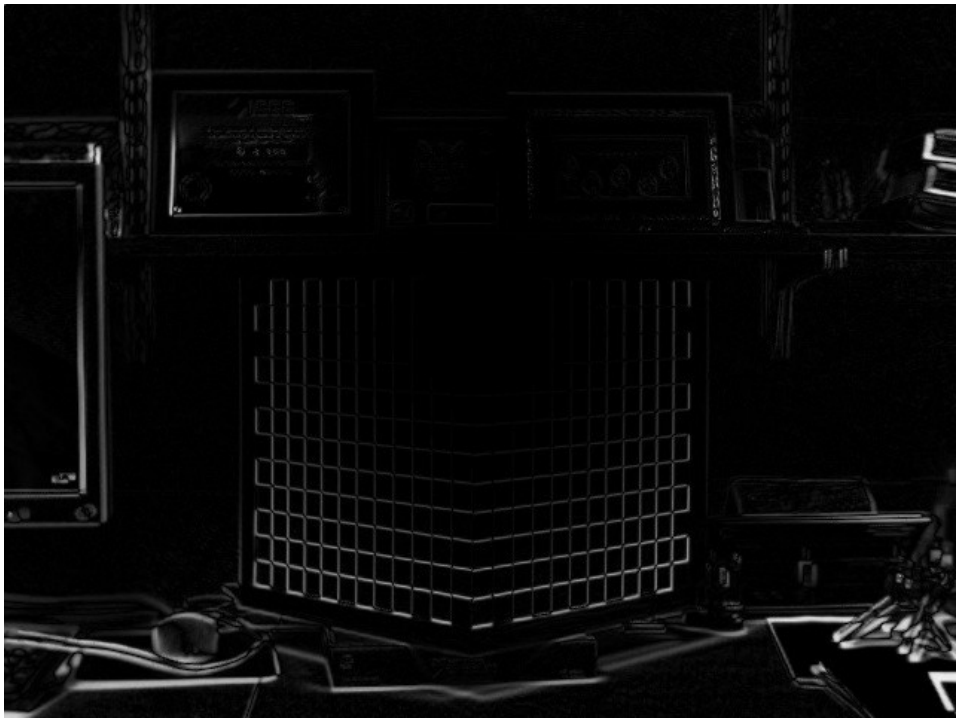
648 pix/4.8 mm = 135 pixels/mm
fx = fy = 8.5 mm x 135 pixels/mm = **1147.5 pixels**

This matches well with the fsx and fsy values found in the intrinsic parameters matrix.

Task 3

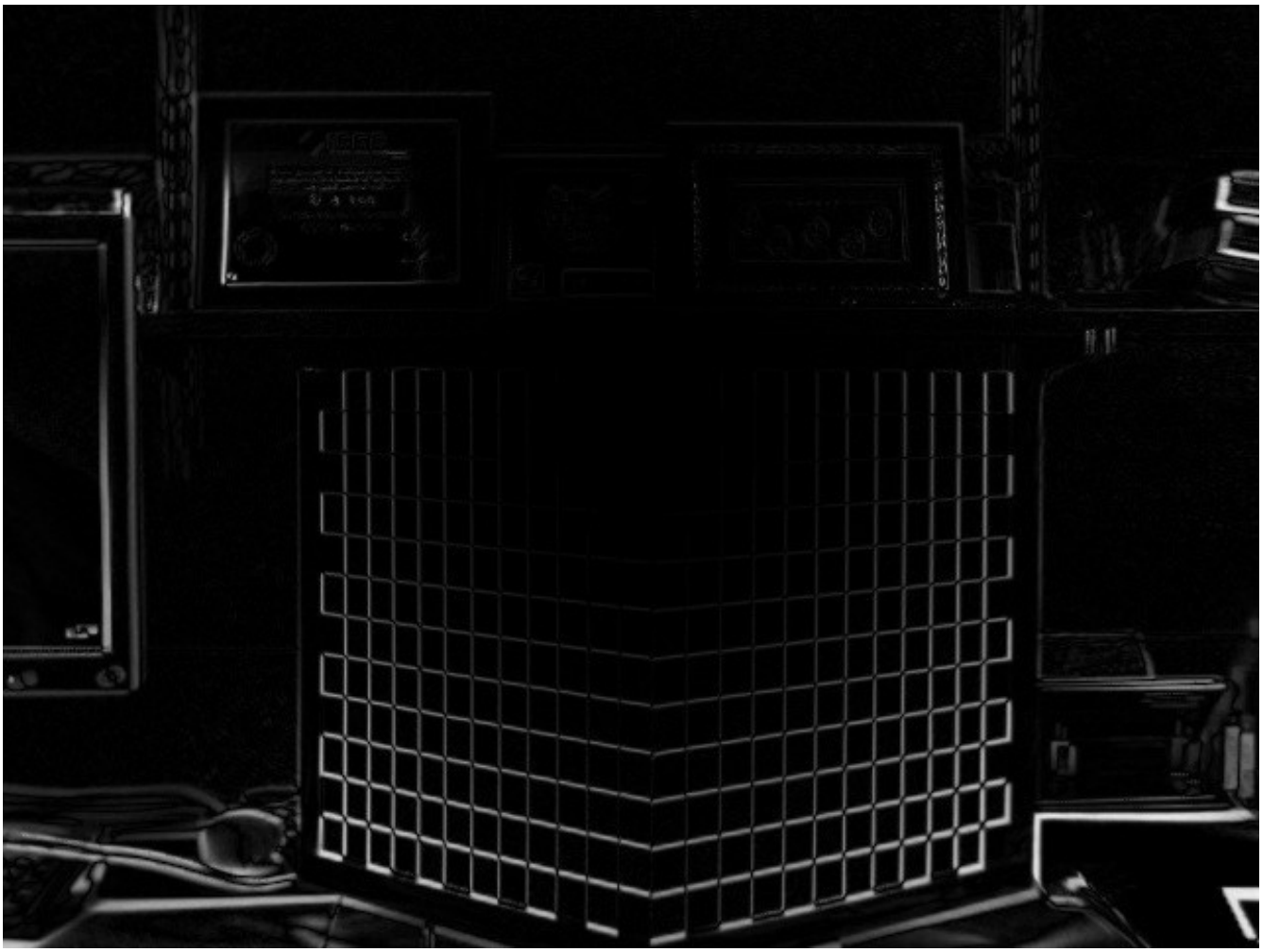
Absolute difference images:

Far



Turned

Close



These images show the difference between the original (distorted) image and the undistorted image, which is corrected for lens distortion.

Task 4

Rotation matrix (R):

```
[[ 0.73571429,    -0.6771657,     0.01308065]
 [-0.00334617,   -0.02294706, -0.99973108]
 [ 0.67728376,    0.73547267,  -0.01914839]]
```

Translation matrix (T):

```
[[-0.0048875 ]
 [10.48000795]
 [46.70723134]]
```

These are the rotation and translation matrices for estimating the pose of a chessboard.

Task 5

Intrinsic parameters of my laptop’s webcam:

[[729.5, 0., 356.1],
 [0., 698.0, 279.0],
 [0., 0., 1.]]

Distortion parameters:

[-0.104, 1.01, -0.00114, 0.00570, -2.16]

Task 6

Absolute difference image:

This is the absolute difference image between a raw frame taken from my laptop’s webcam and the same frame corrected for lens distortion.