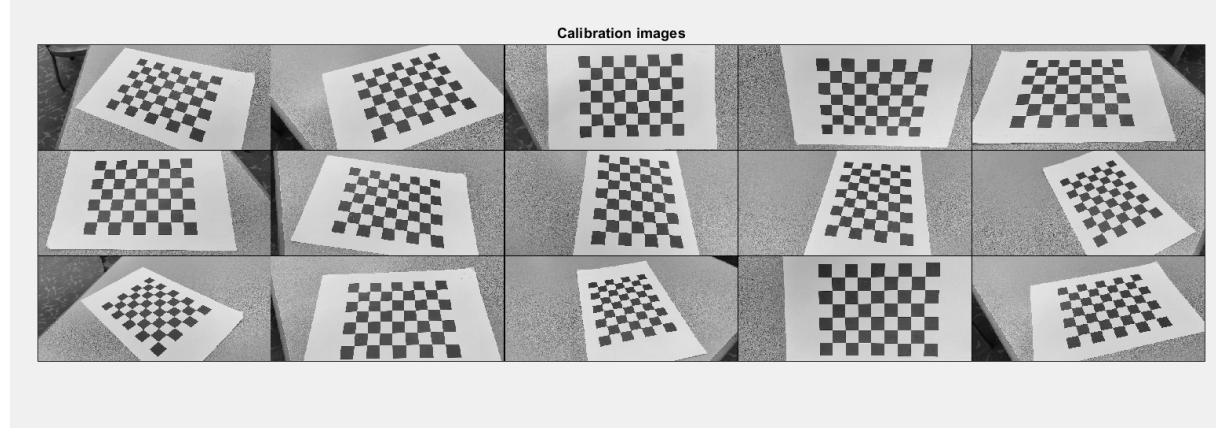


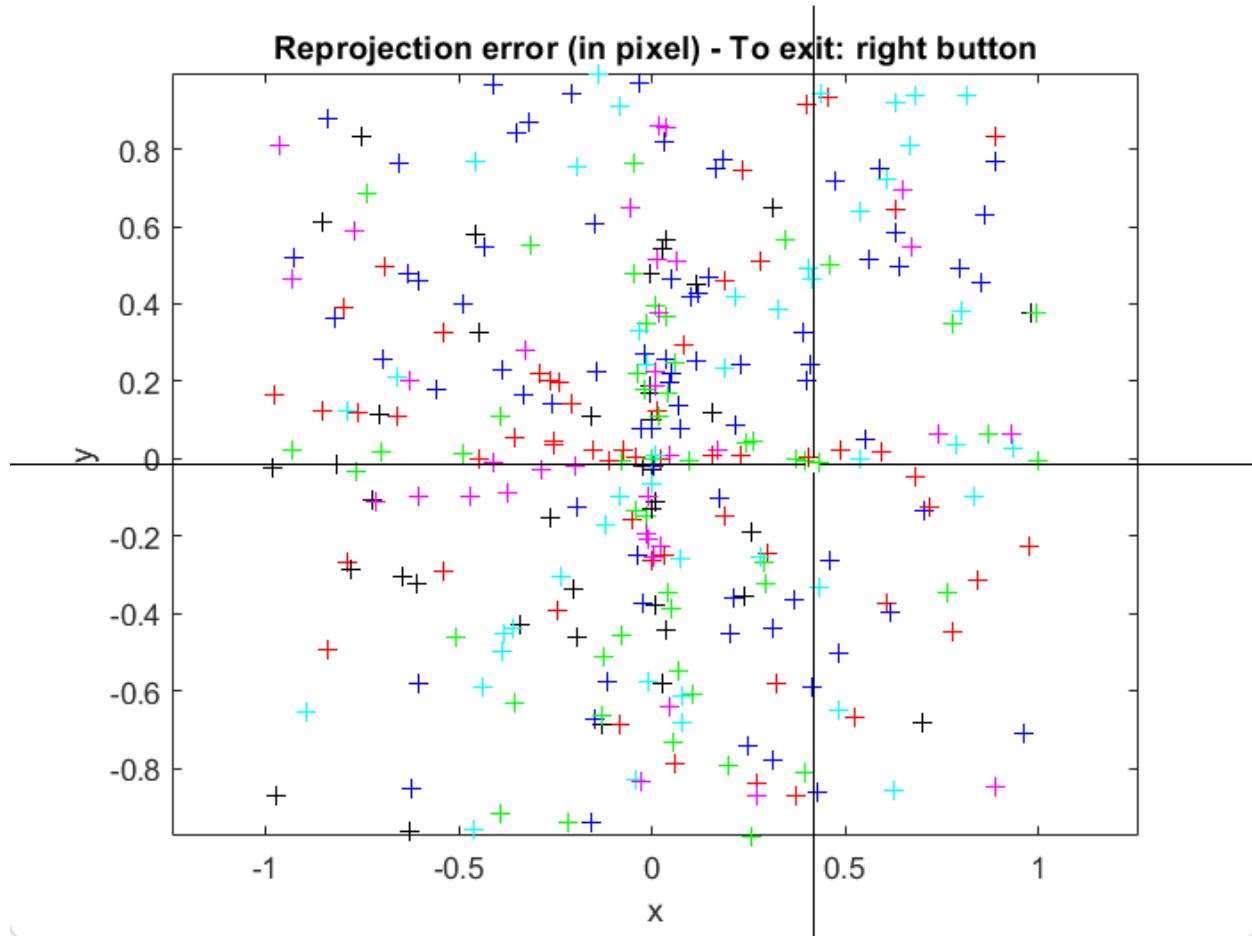
# LAB5- Report

## 1. Calibration of Image

### a. Camera images used for calibration



### b. Reprojection pixel error in the report



**c. Calibration parameters in the report**

Calibration results (with uncertainties):

Focal Length:       $fc = [ 3115.85842 \quad 3124.59131 ] \pm [ 53.55898 \quad 57.21404 ]$

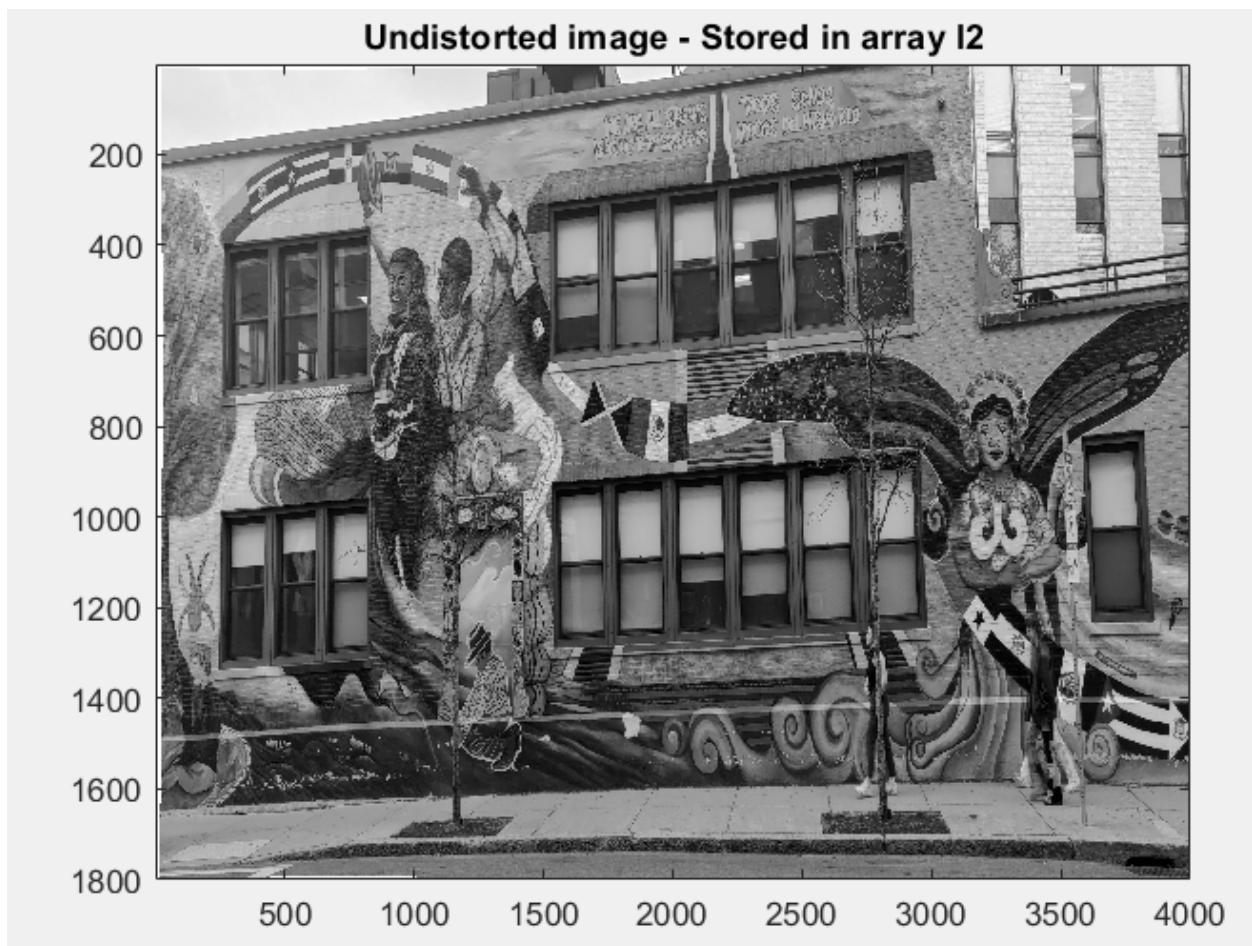
Principal point:     $cc = [ 1958.21549 \quad 862.46051 ] \pm [ 46.28489 \quad 43.90364 ]$

Skew:                $\alpha_c = [ 0.00000 ] \pm [ 0.00000 ] \Rightarrow$  angle of pixel axes  $= 90.00000 \pm 0.00000$  degrees

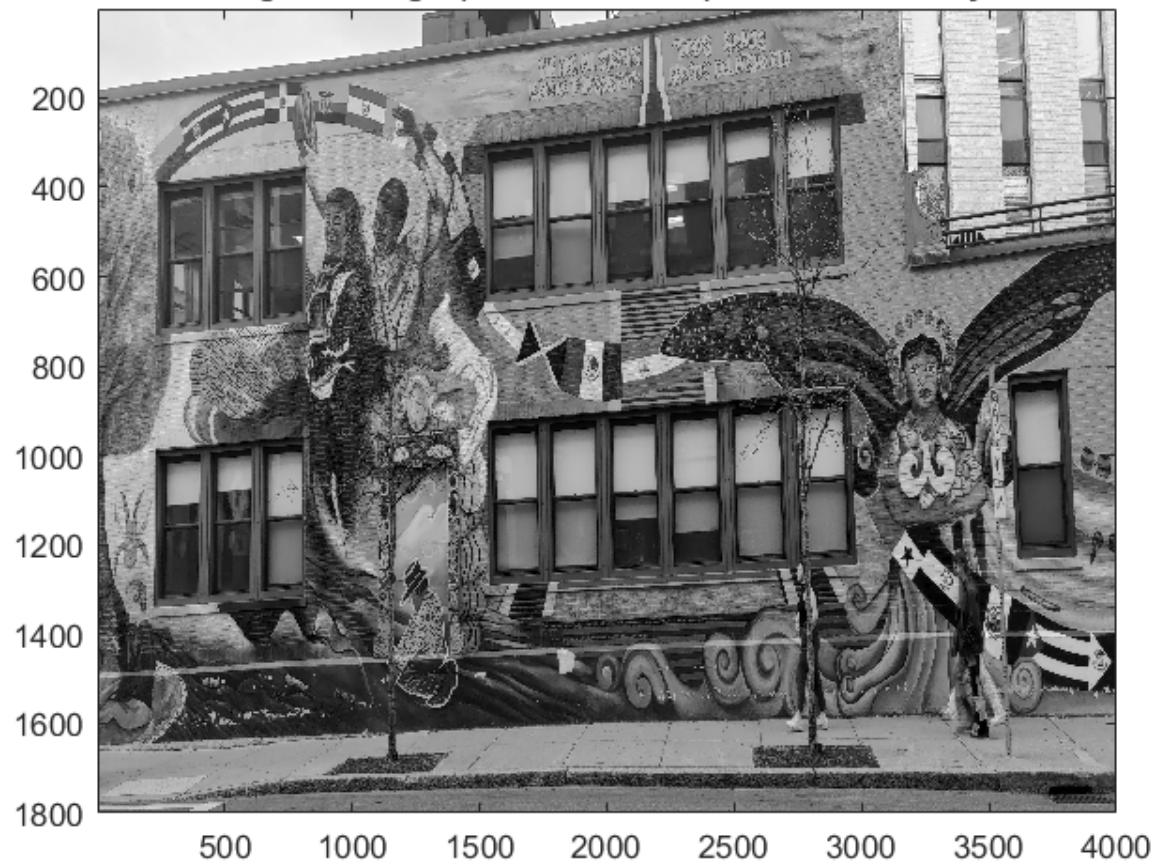
Distortion:           $kc = [ 0.05756 \quad -0.20212 \quad 0.00206 \quad -0.00346 \quad 0.00000 ] \pm [ 0.03896 \quad 0.22385 \quad 0.00394 \quad 0.00601 \quad 0.00000 ]$

Pixel error:          $err = [ 0.29926 \quad 0.31323 ]$

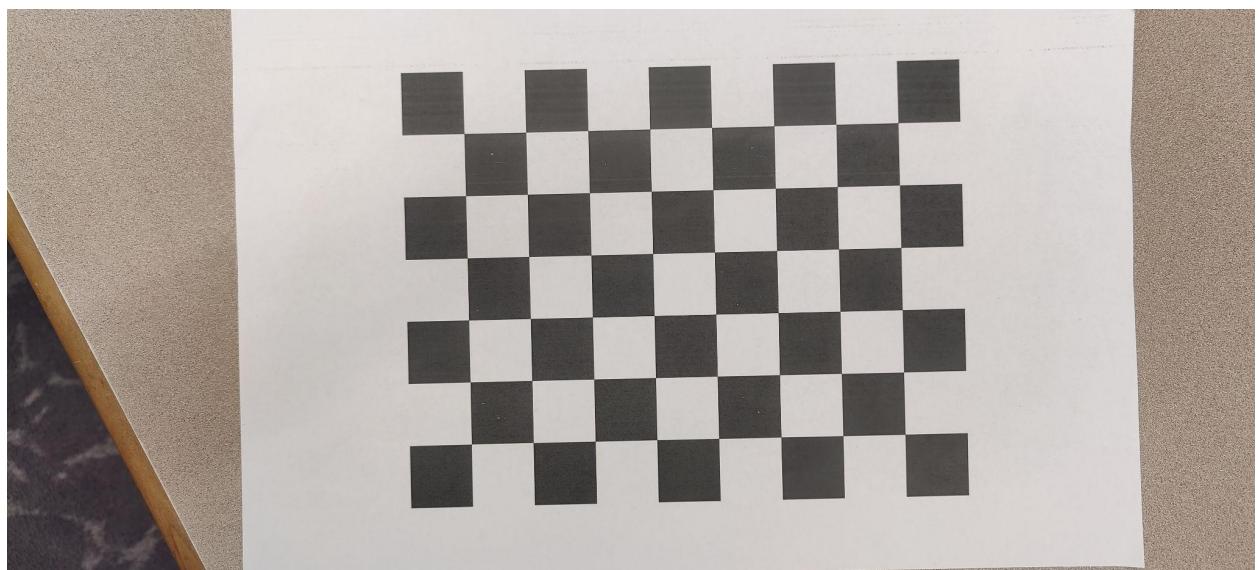
**d. An image before and after calibration is in the report**



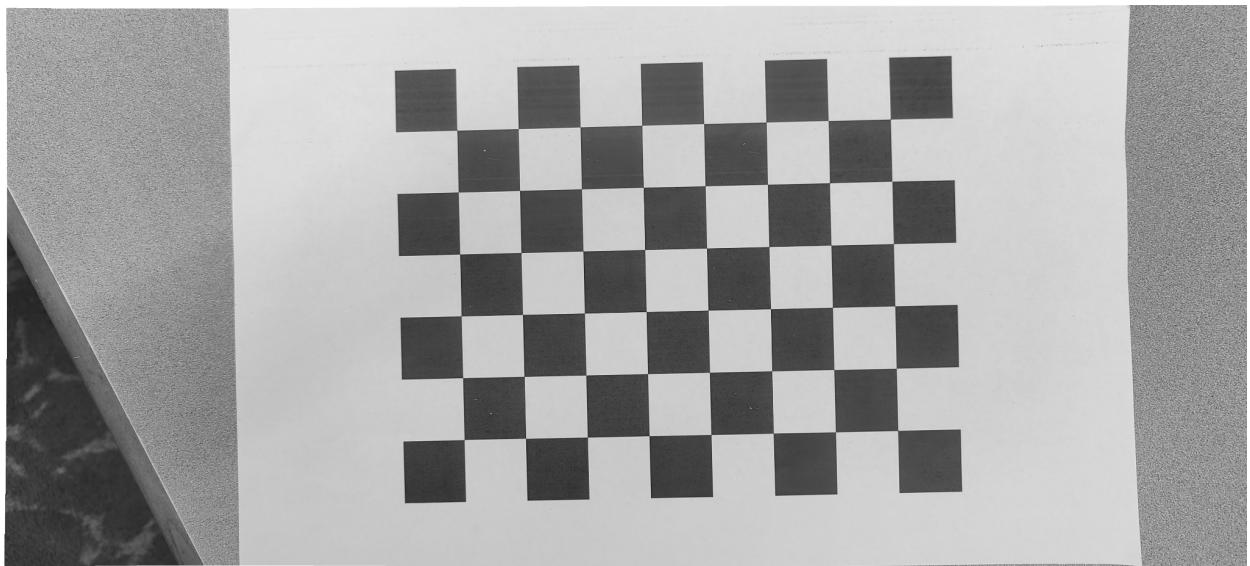
**Original image (with distortion) - Stored in array I**



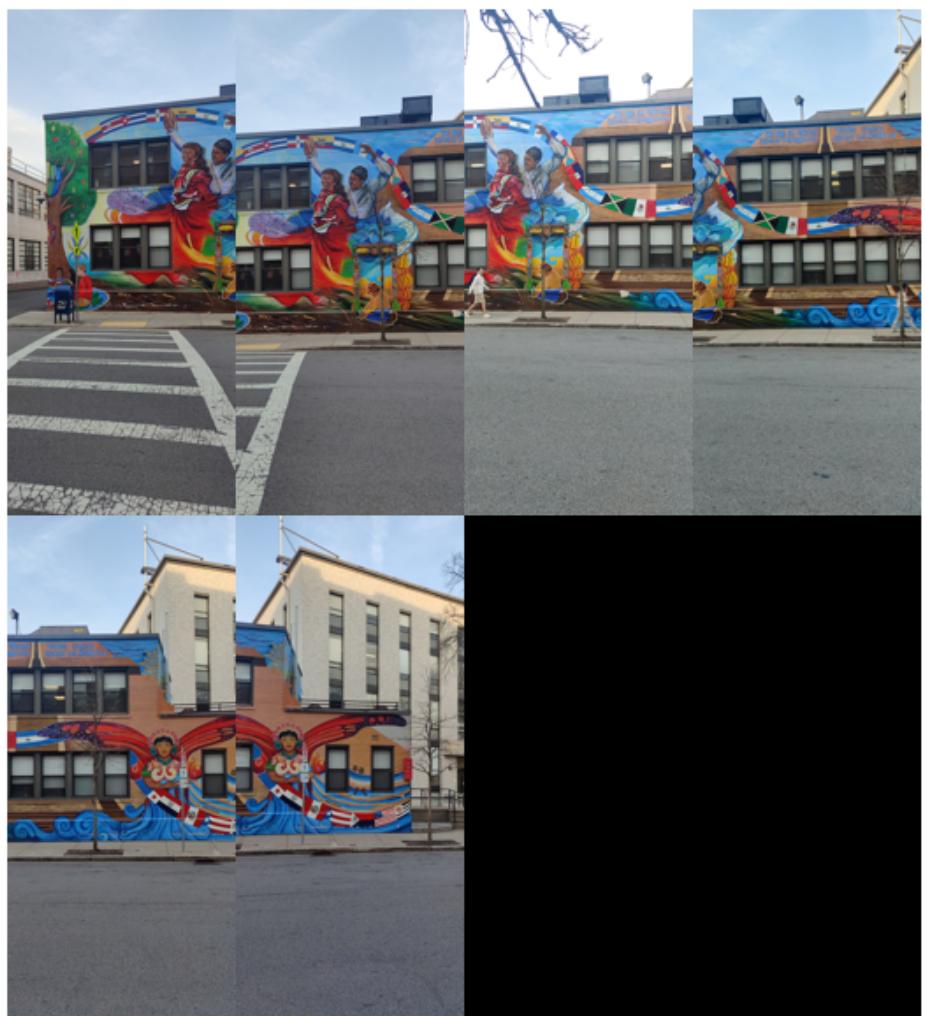
**Original Image**



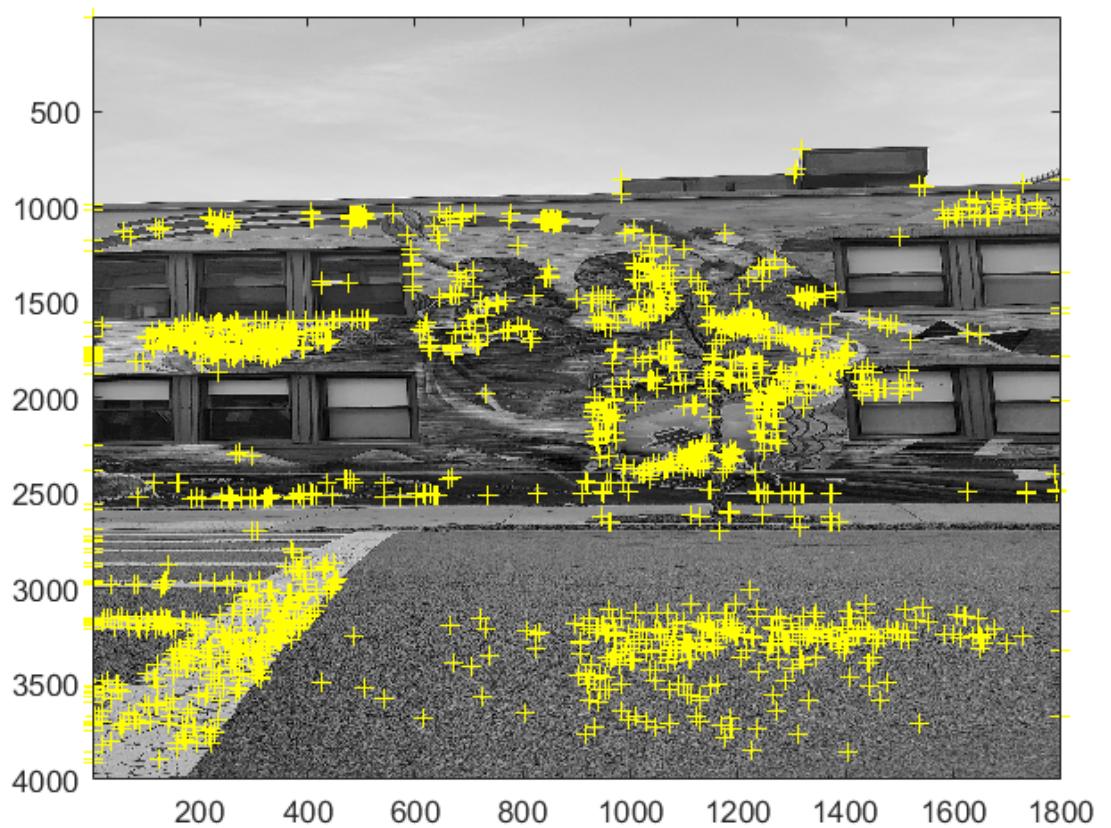
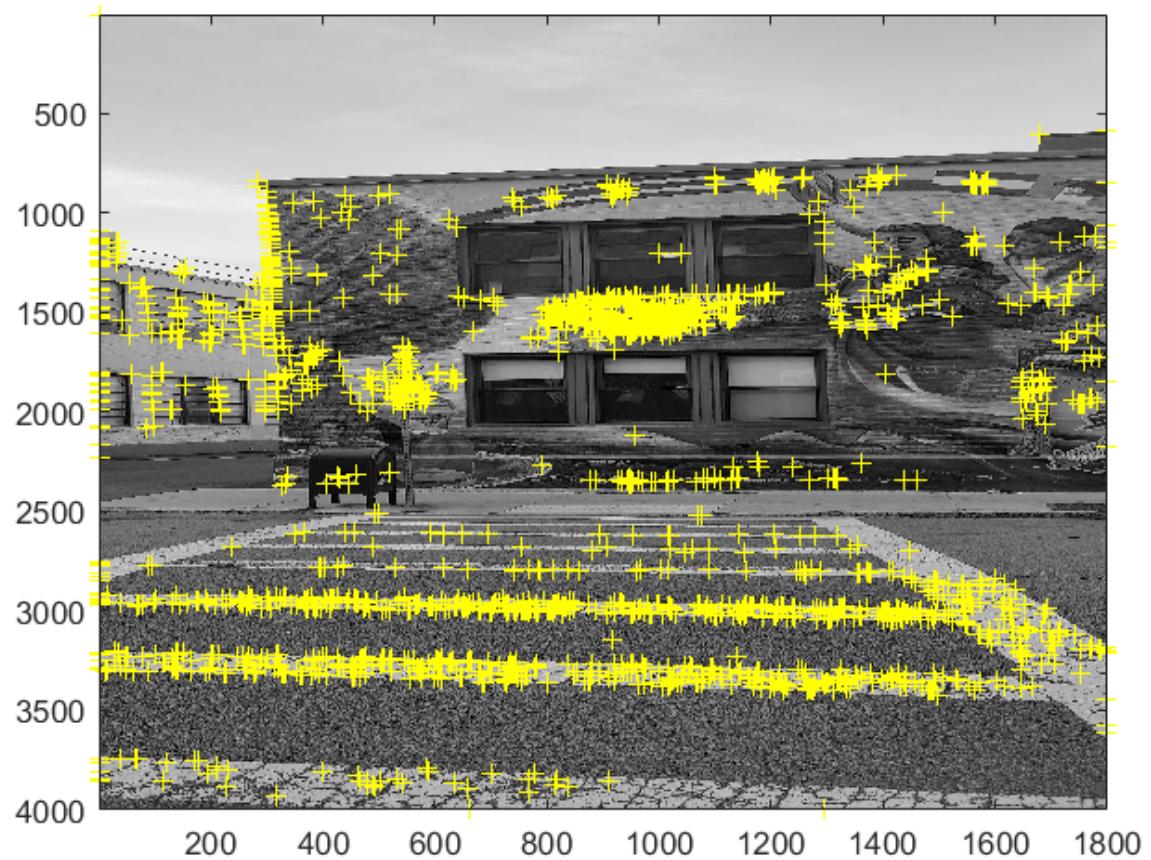
Undistorted image

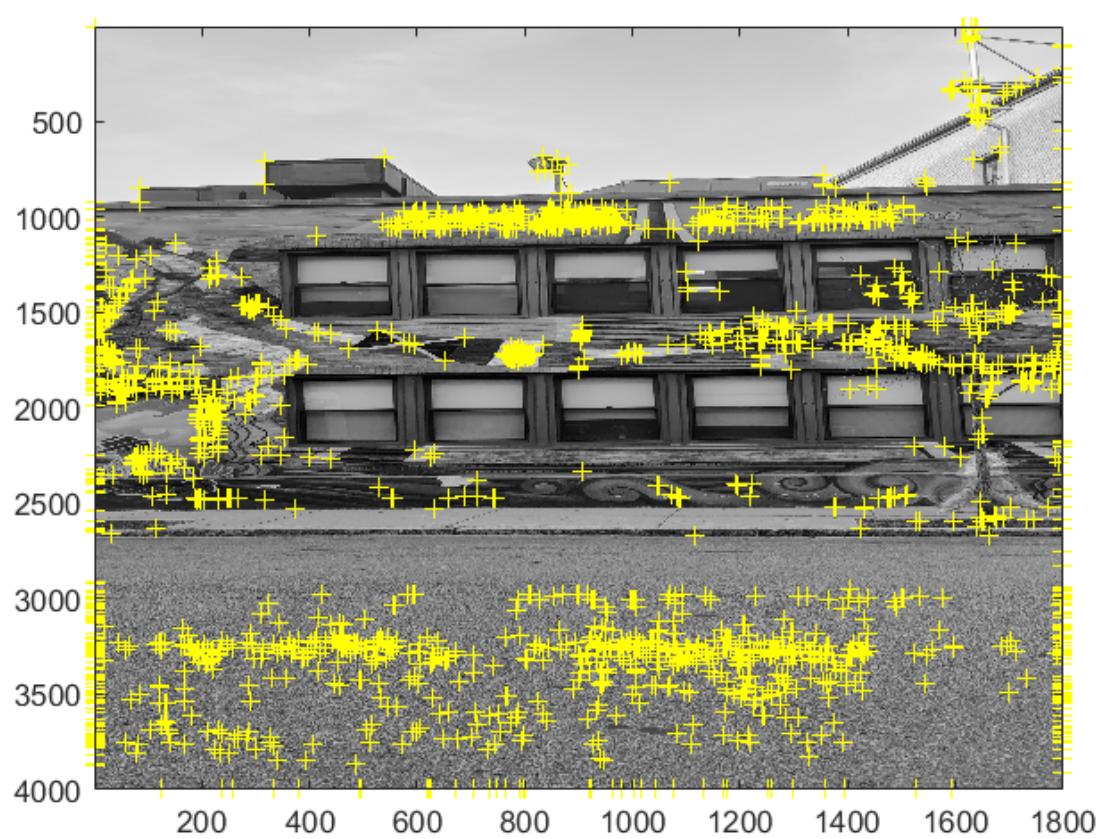
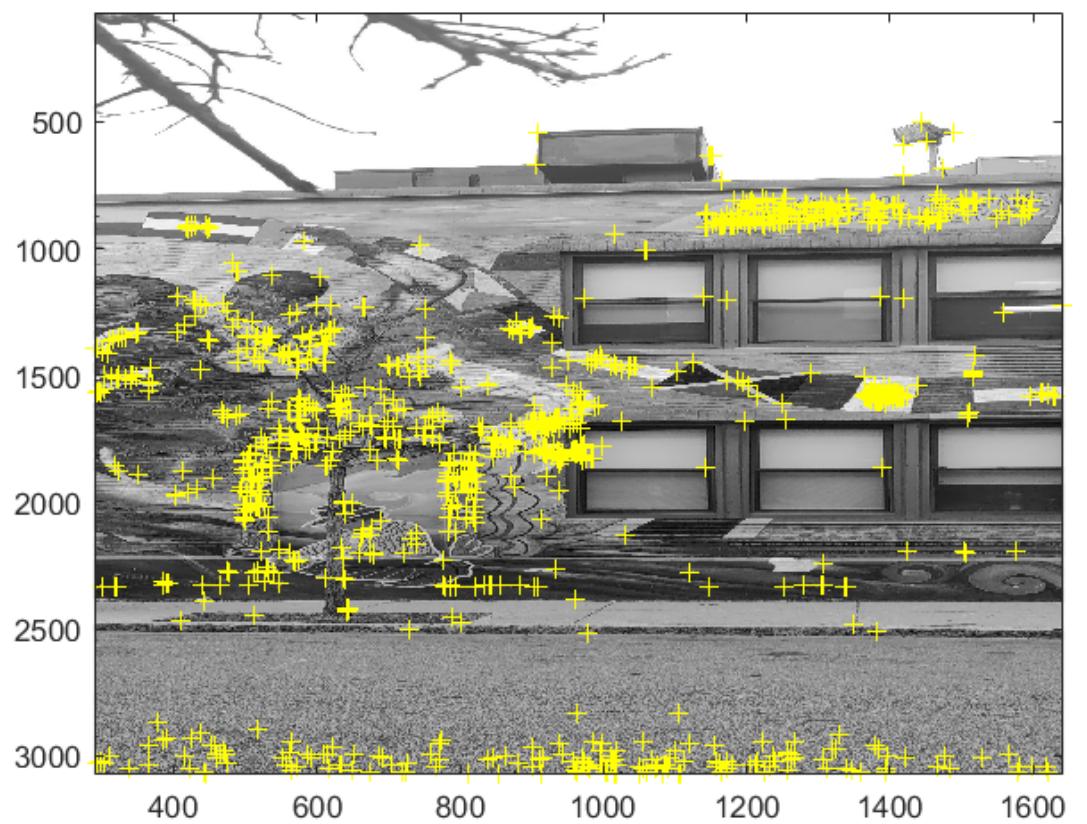


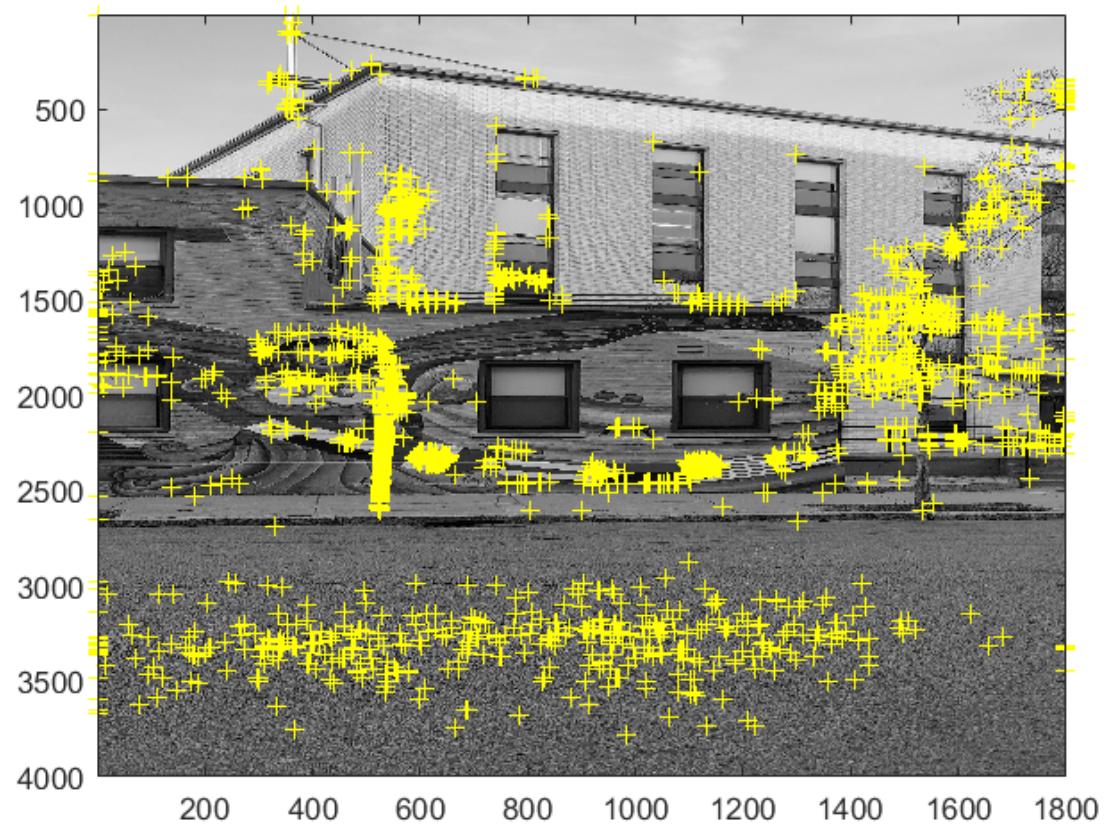
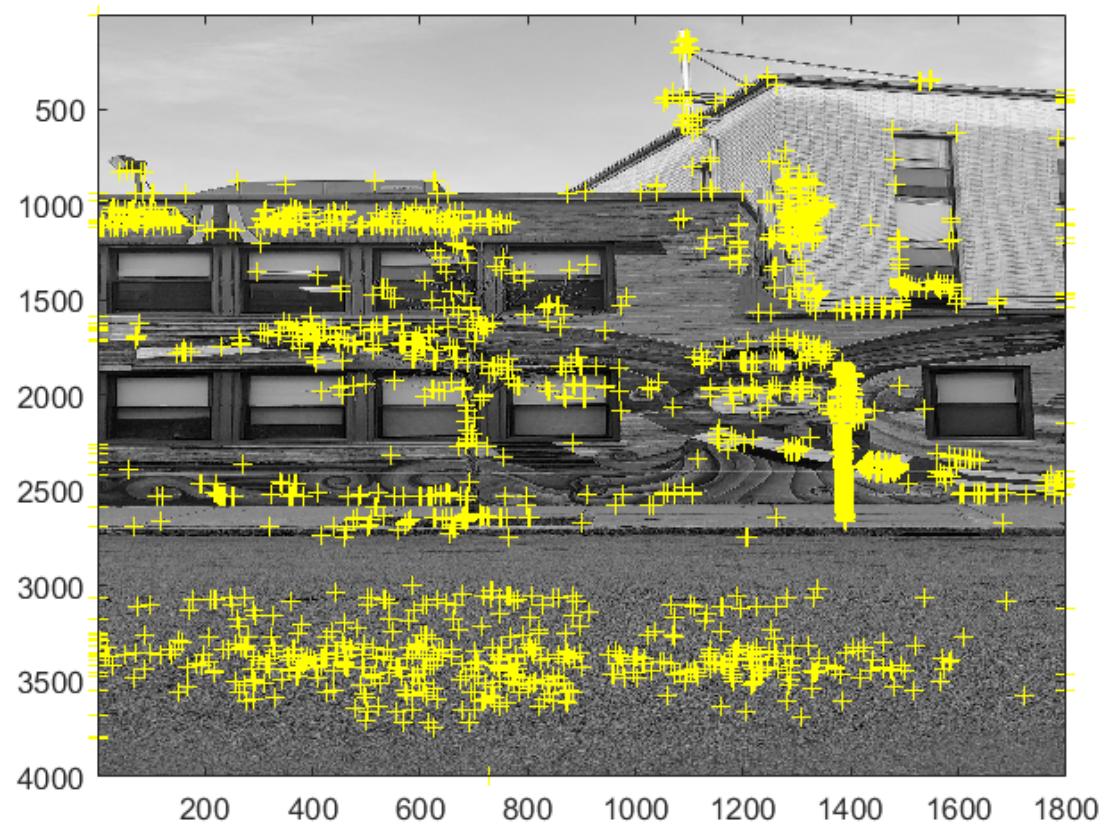
**2. LSC mosaic**  
**a. LSC image set**



**b. Distribution of Harris corners across the LSU image set**







c. Final LSC mosaic

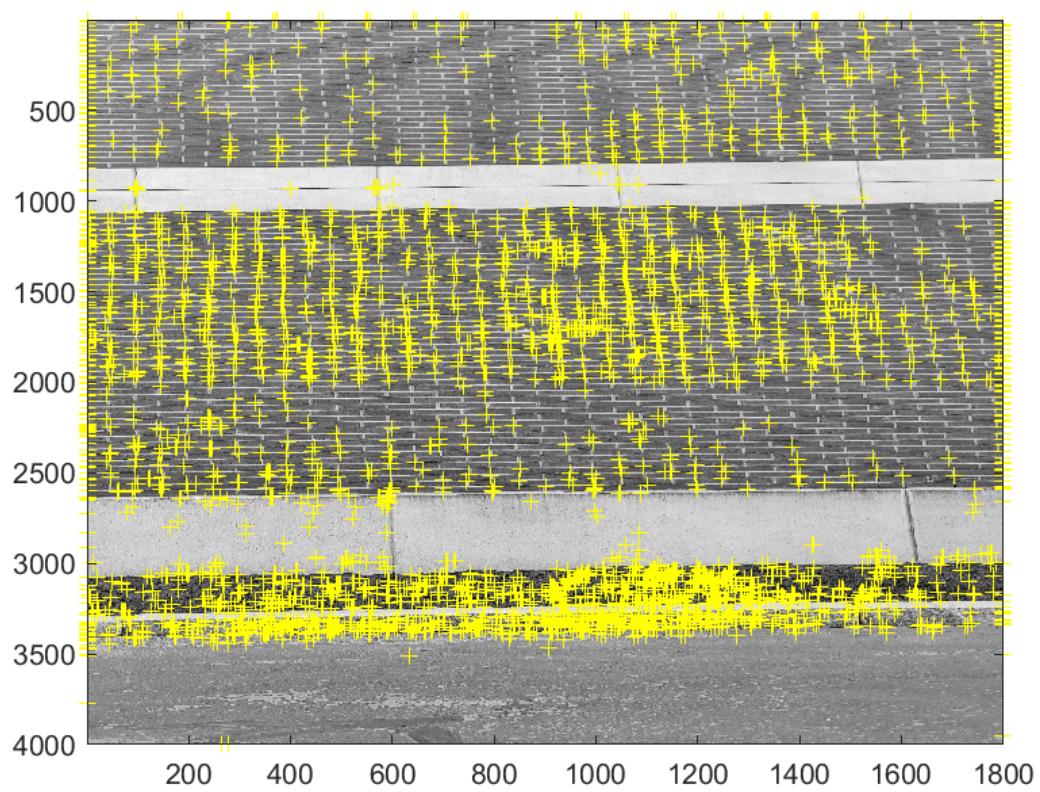
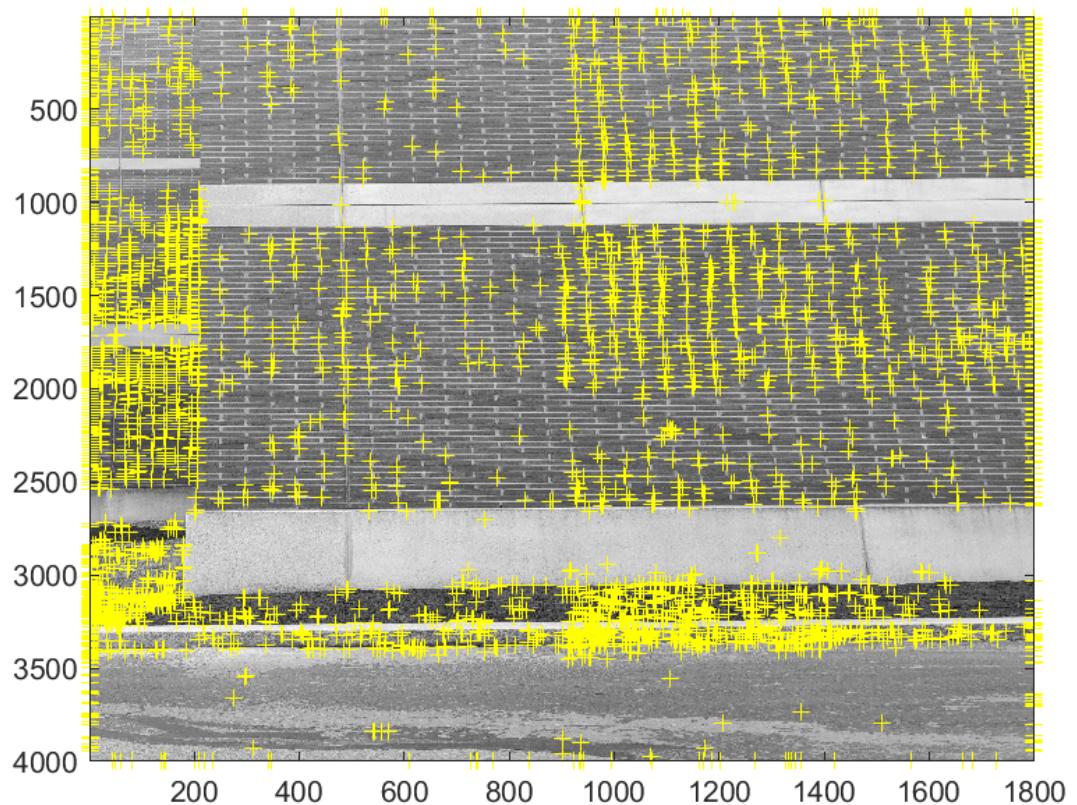


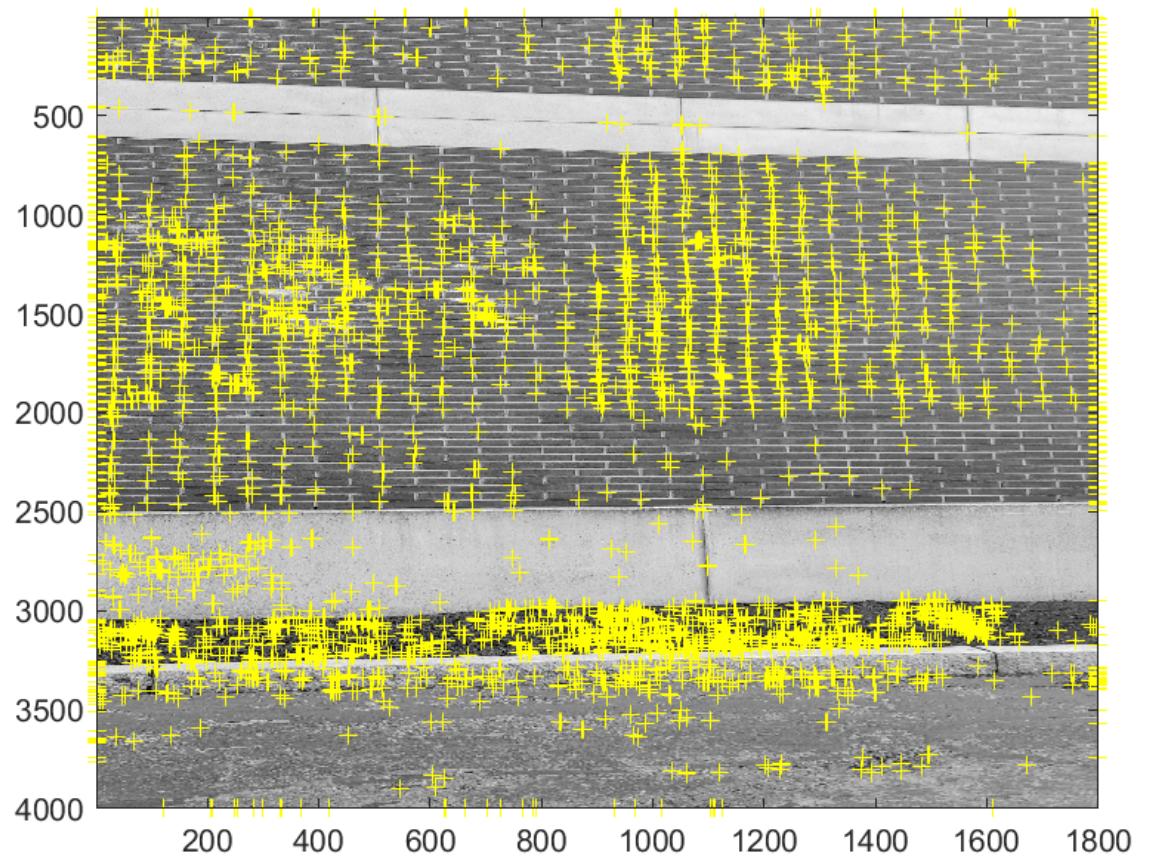
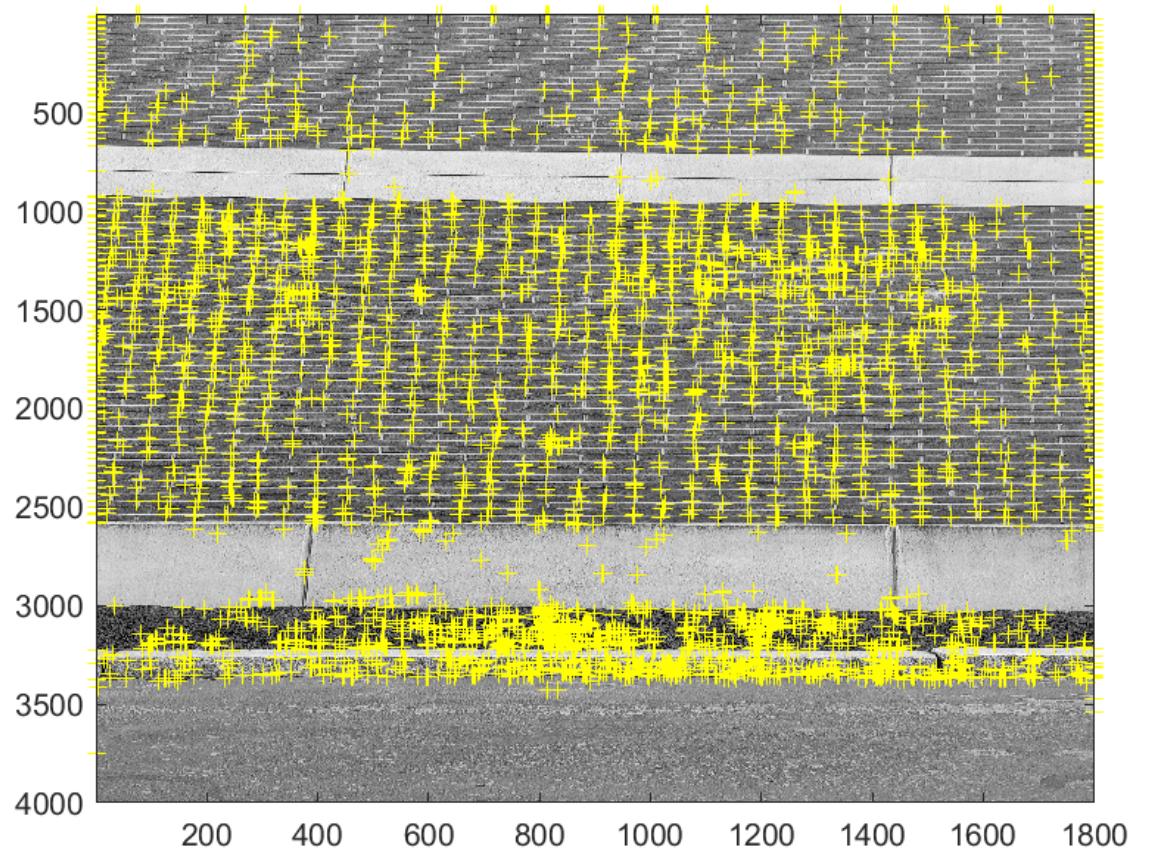
d. Discussion of adjustment/intermediate image steps you took (2-3 sentences)

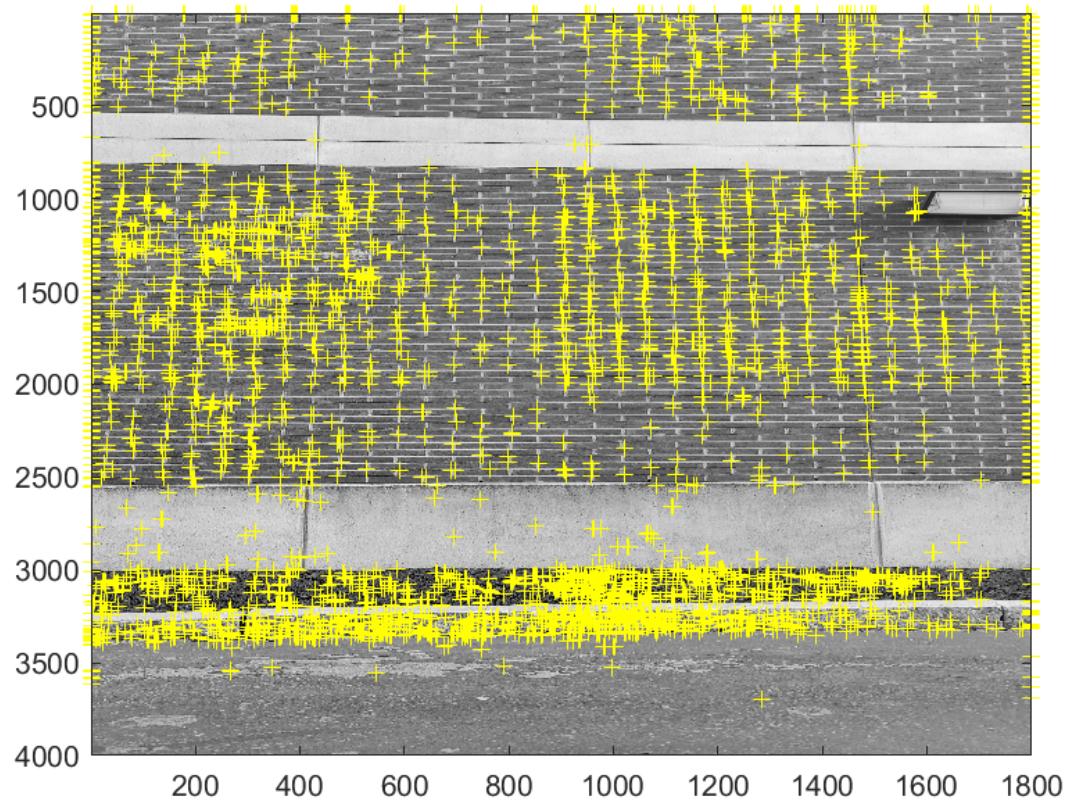
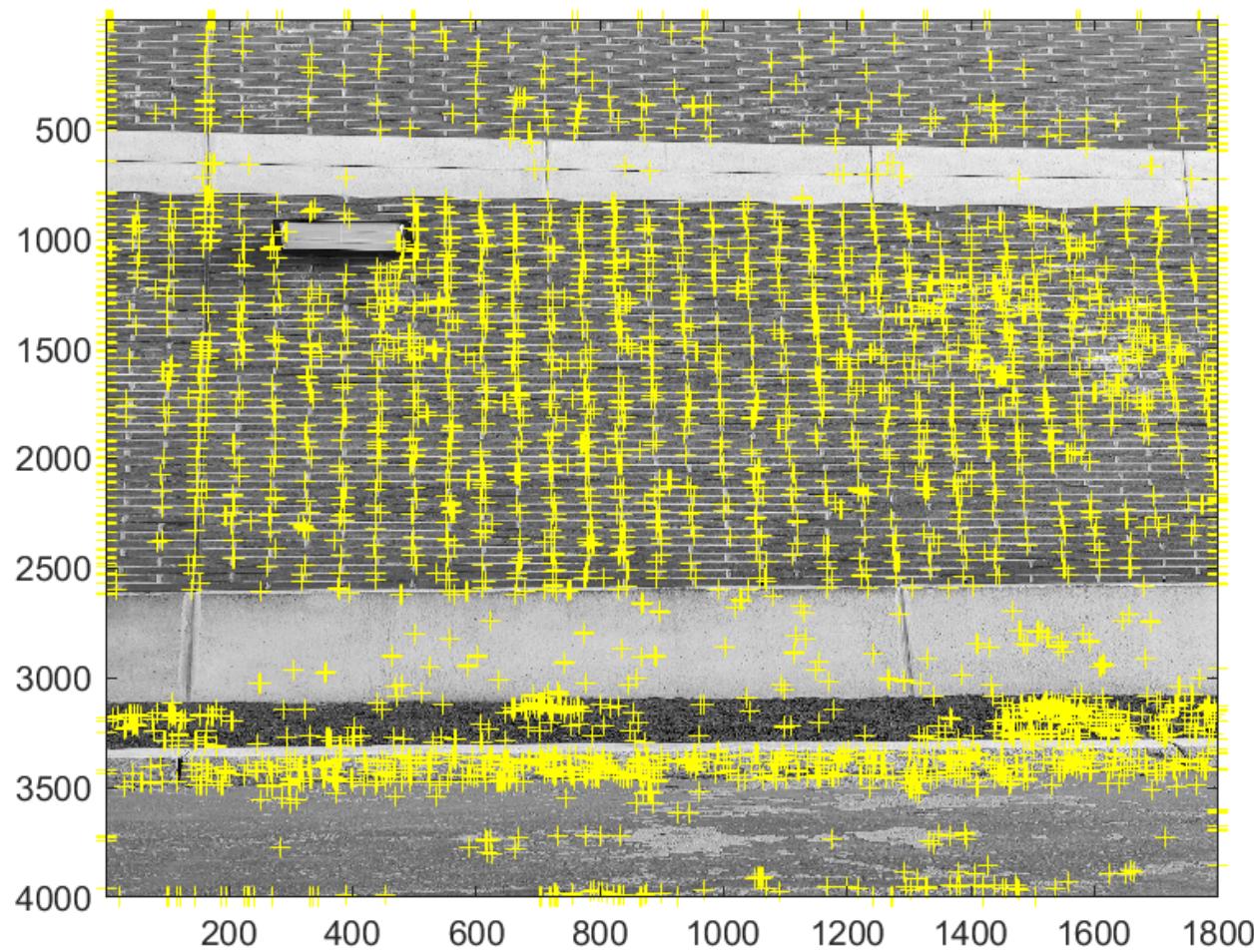
I changed the feature extractor algorithm from Surf to Harris corner detector. Then in the case of the LSN mosaic I used the value of the maximum number of interest points to be 2000 and the value of tile [2 2] so that the feature points are distributed uniformly across the image. Then using the example code we created the panorama image.

### **3. Cinder block/brick wall “mosaic”**

#### **a. Initial images with Harris corners**







**b. Final cinder block image**

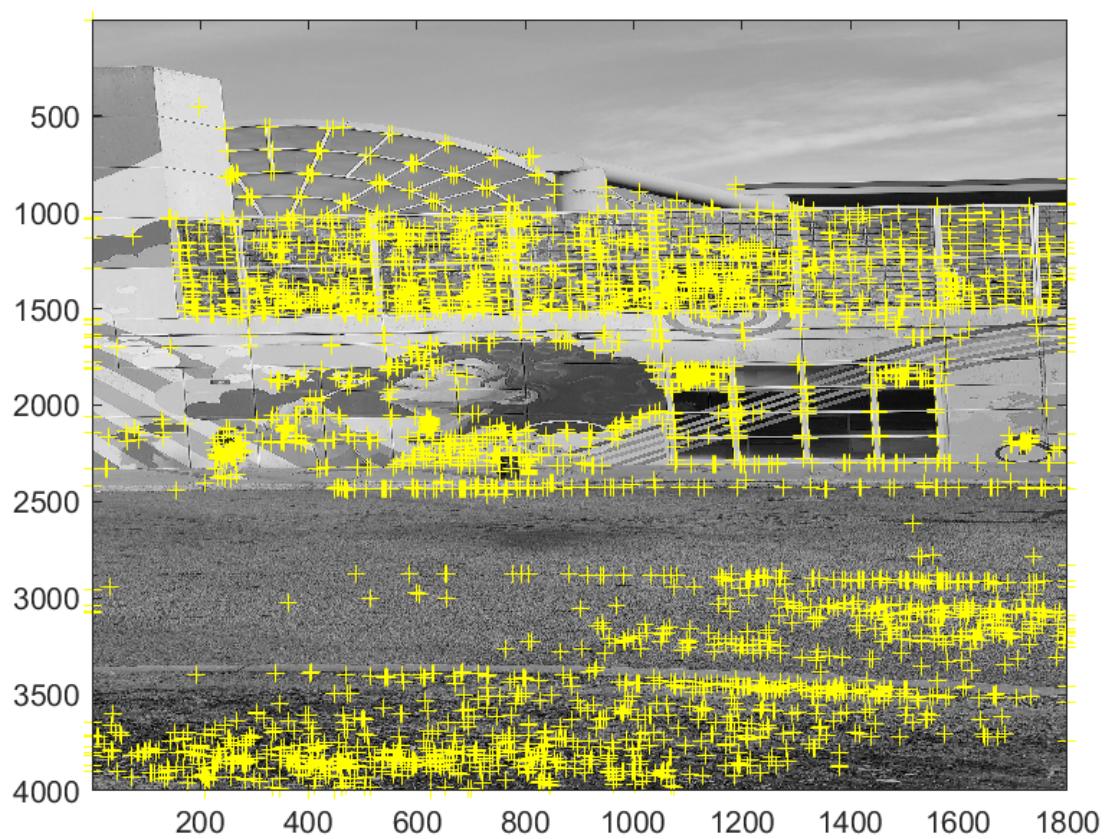
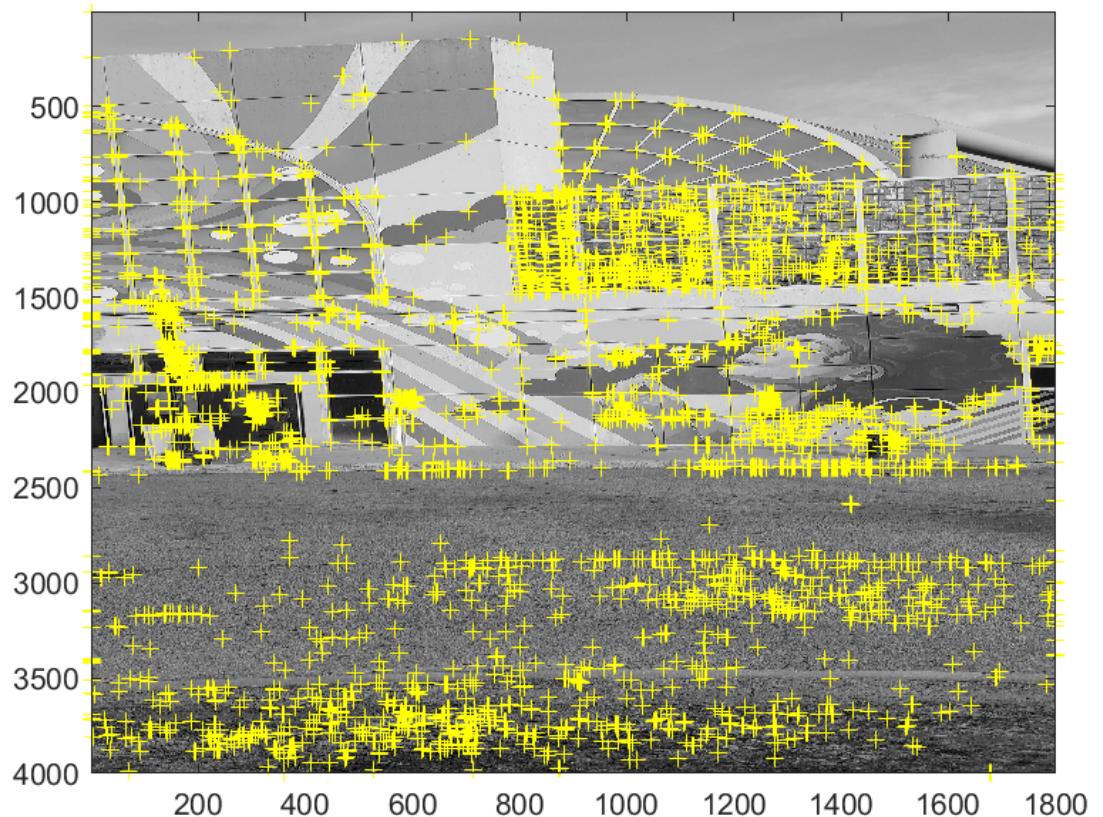


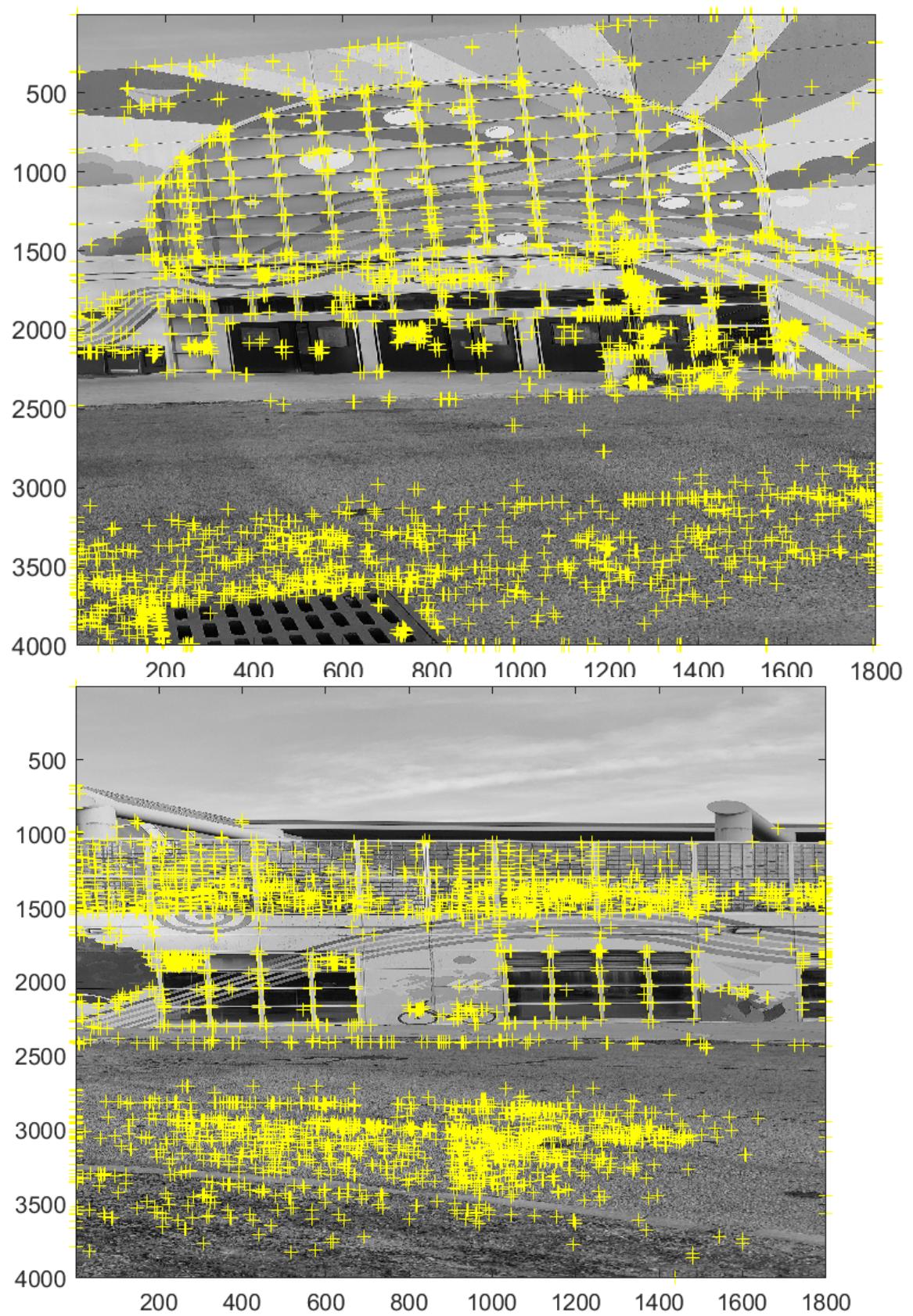
**c. Explanation of cinder block/brick wall performance compared to the LSC mural (2-3 sentences)**

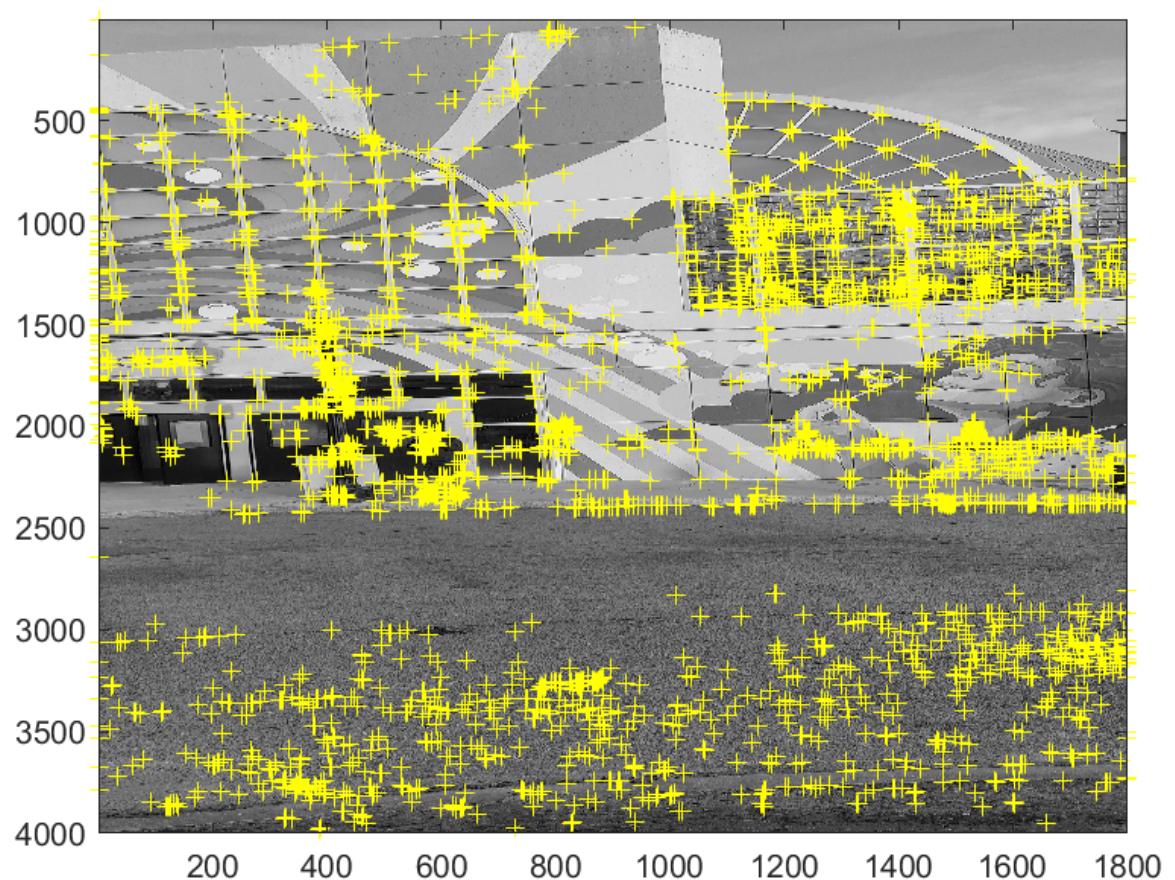
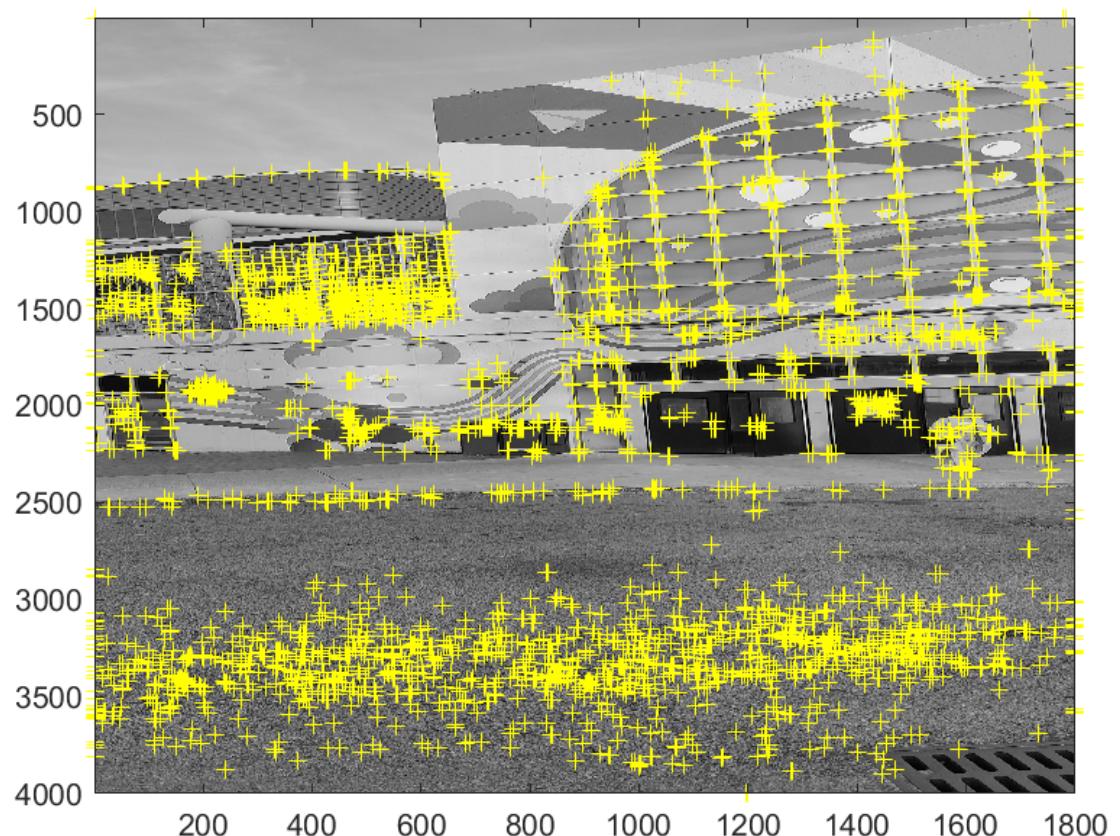
So, for the case of the brick wall, since we have a lot of corners, I had to increase the value of N to 3500 so that we get enough matching points to complete the mosaic. And since we have a lot more matching points in this case we can see that the mosaic is way cleaner and the lines are more aligned as compared to the LSC mosaic. Also since we have a lot of corners throughout the image we can see the feature points are uniformly distributed in the image.

#### 4. Third “mosaic”

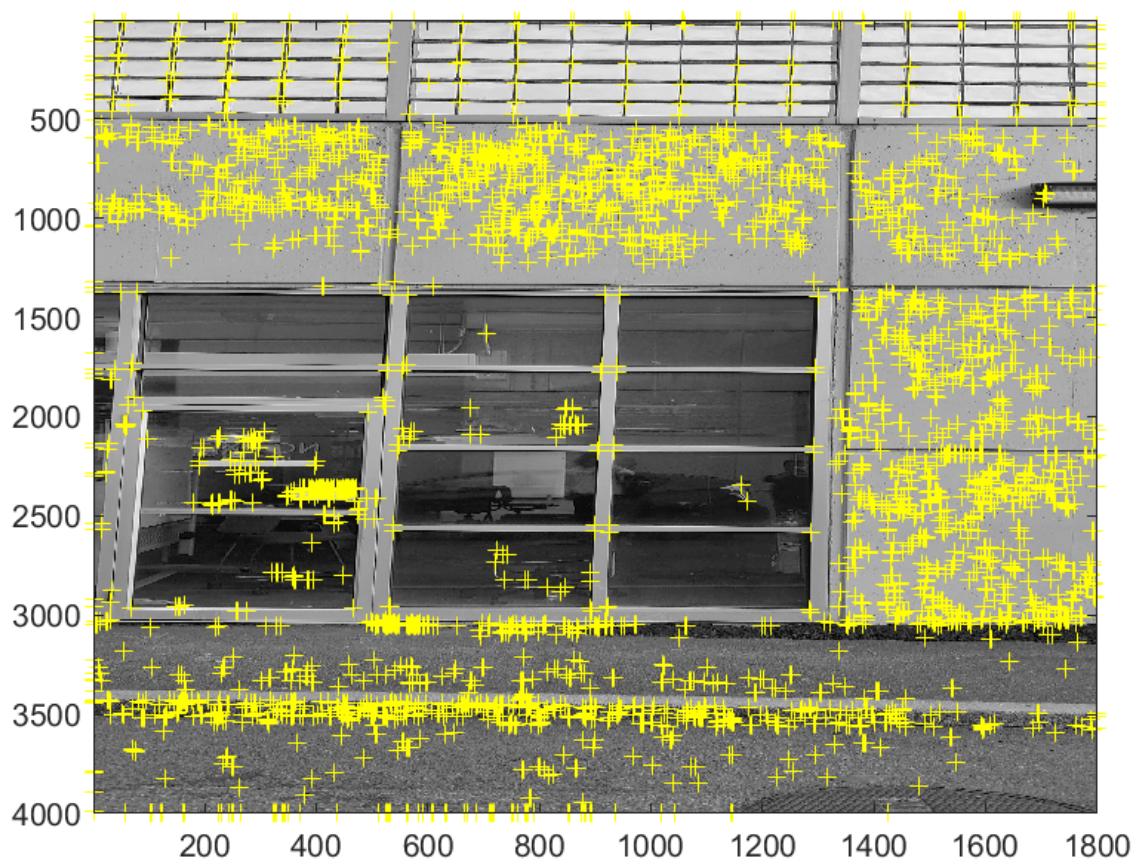
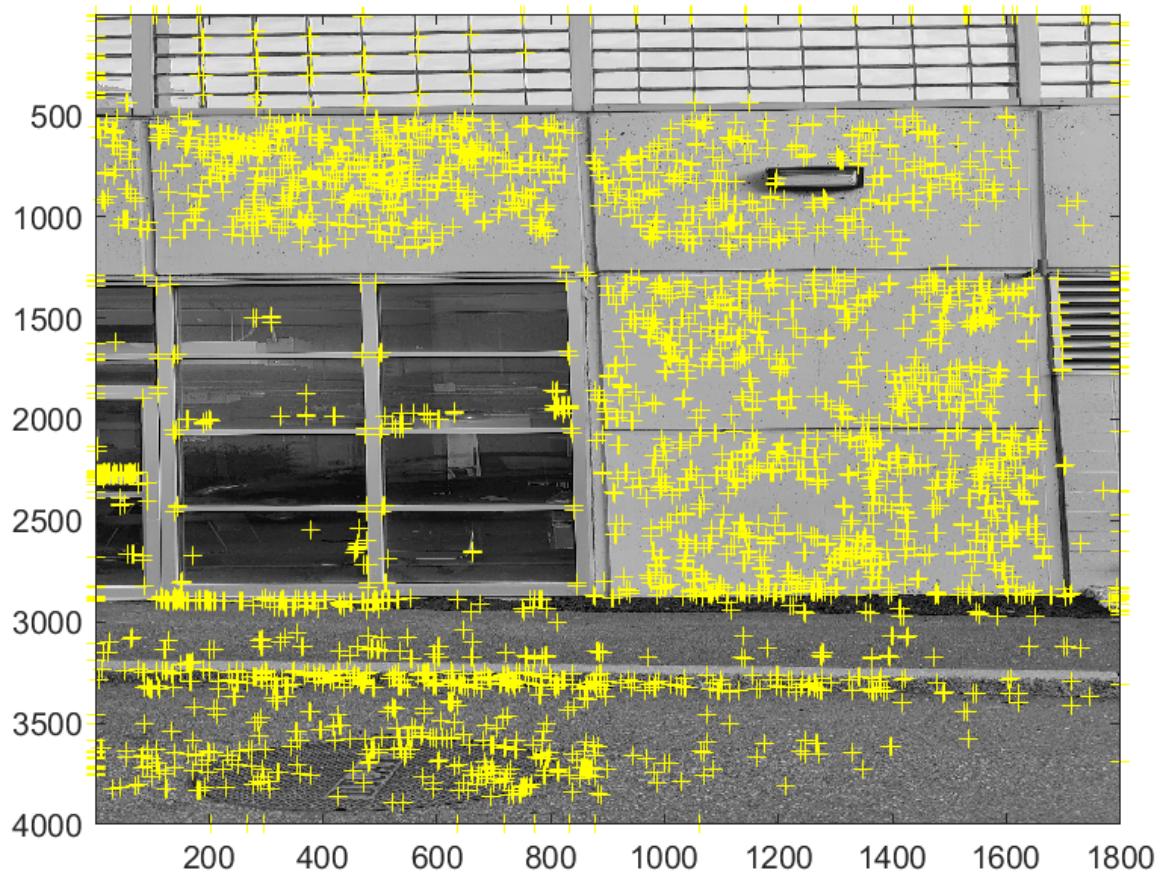
##### a. Initial images with Harris corners with 15% overlap

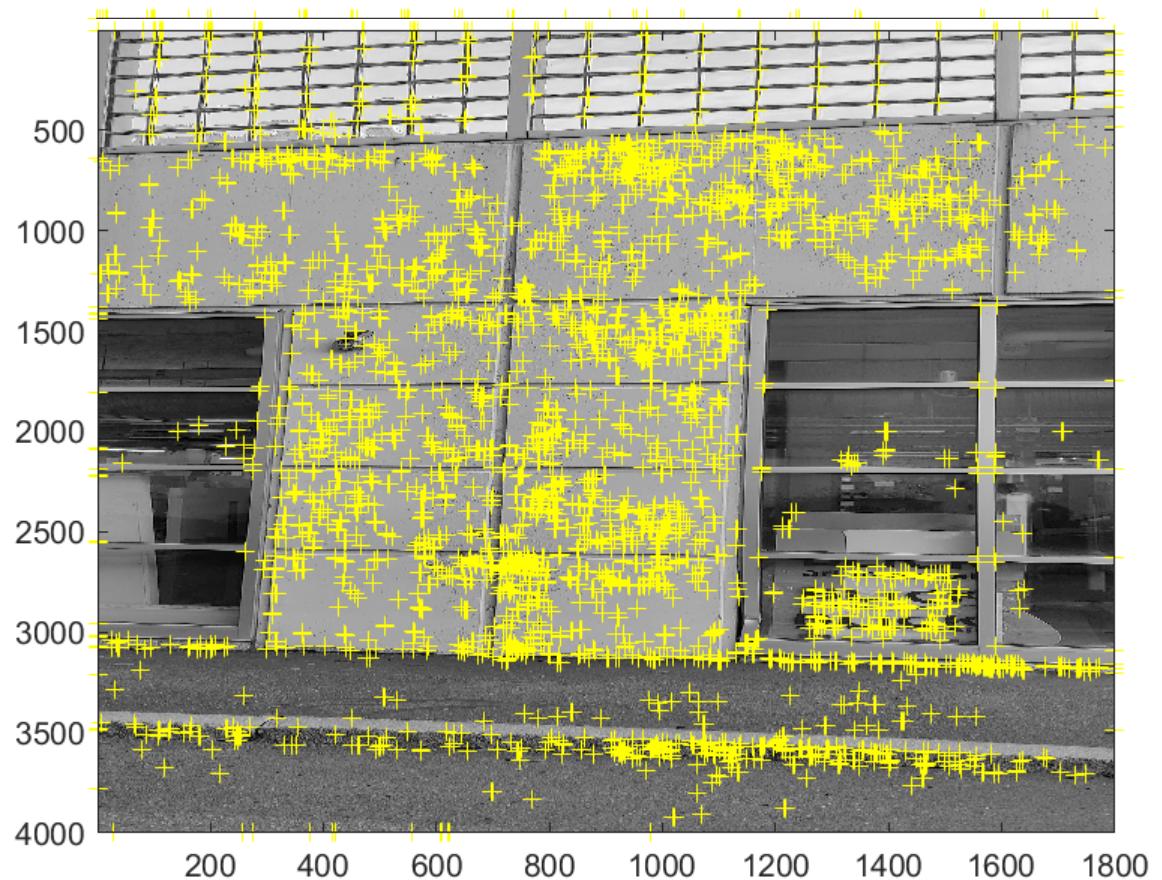
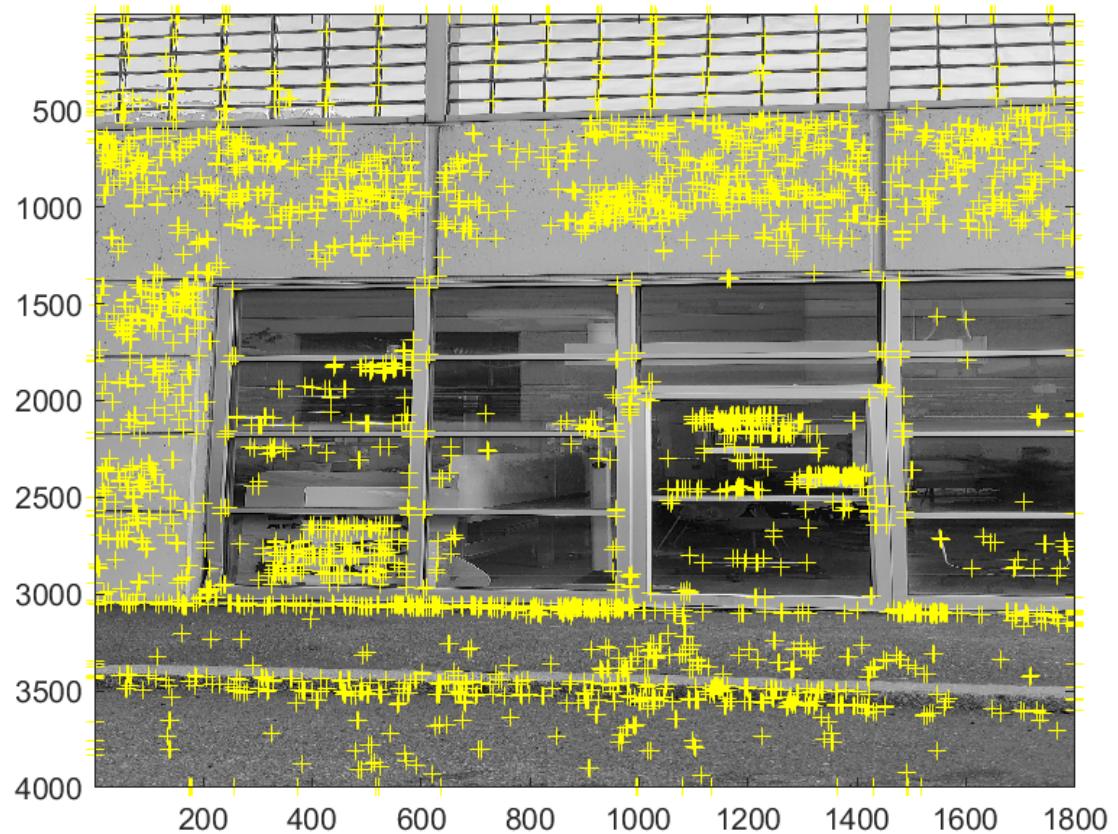


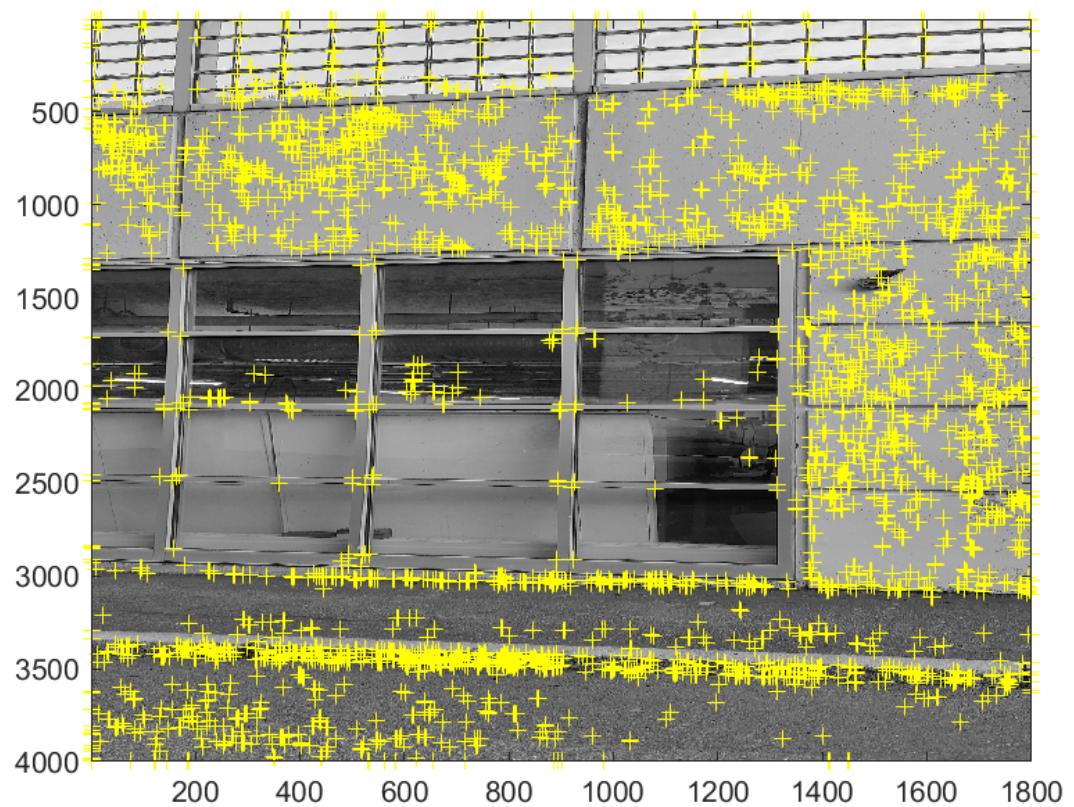
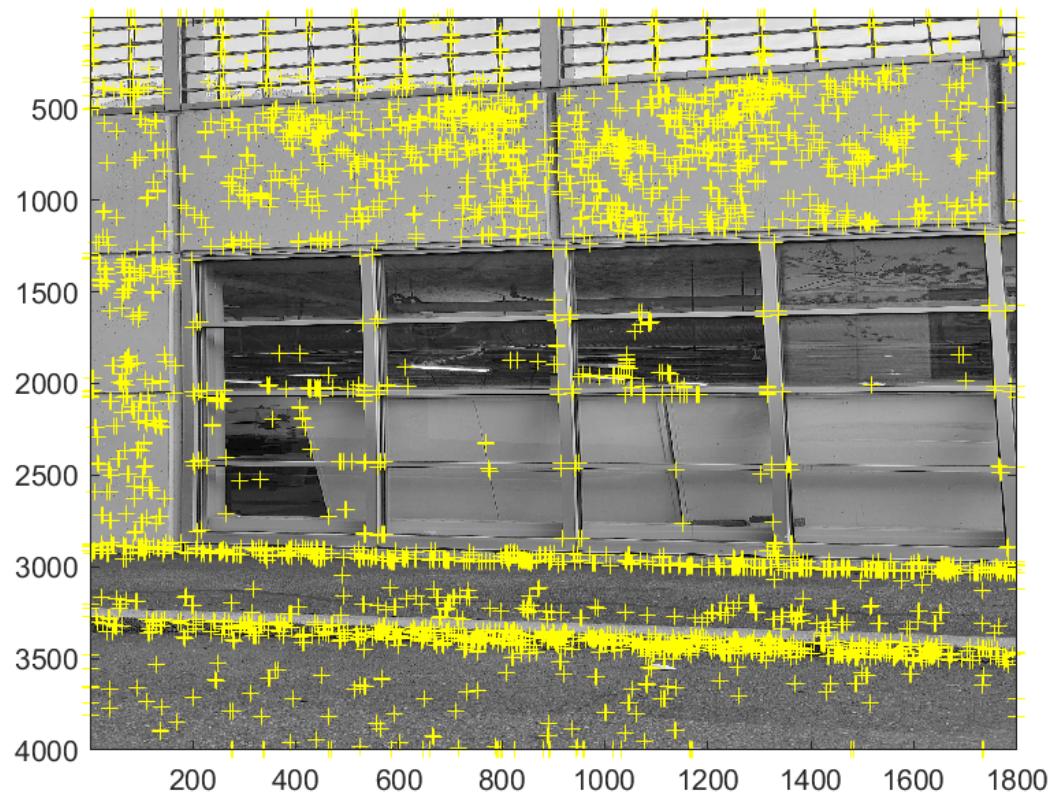




**b. Initial images with Harris corners with 50% overlap**







c. Final mosaic with 15% overlap



**d. Final mosaic with 50% overlap**



**e. Discussion of performance with 15% and 50% overlap**

As we can see from the final mosaic that we get for both cases is that there is a trade off ie. in the case of 15% overlap we can see that we are able to achieve a bigger picture covering more area whereas, in the case of 50% overlap, we can see that the image is way cleaner and more perfectly aligned but the area covered is way less making the use of mosaic obsolete. So, if we want a better cleaner mosaic we can go for a higher overlap percentage, and if we want to cover more area we can have a lower overlap percentage but with sufficient feature matches

**f. Description of any adjustments/modifications you made**

The only adjustment/modification I made was changing the value of N in the Harris corner detector.