PROJECT THREE

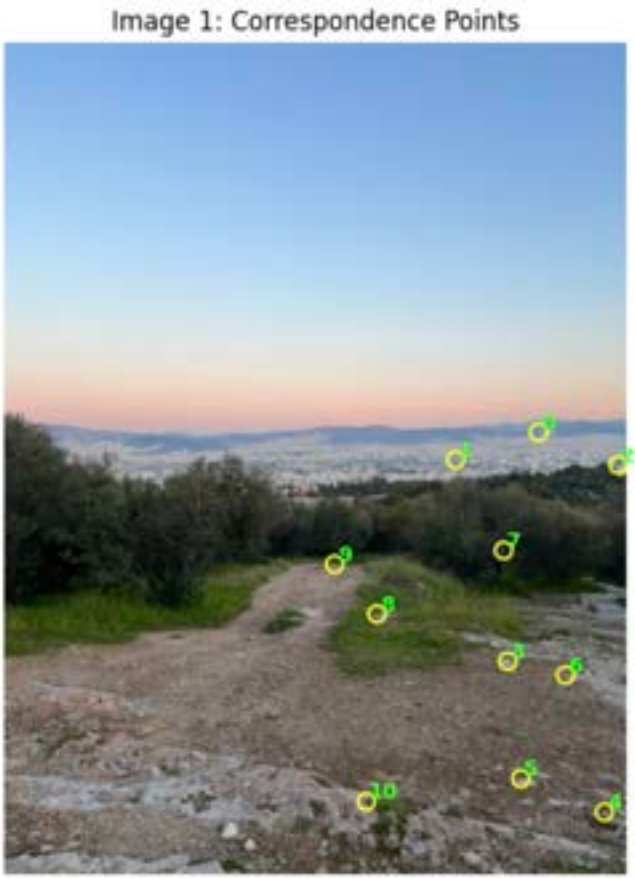
Part A.1

Below are two sets of images with projective transformations:

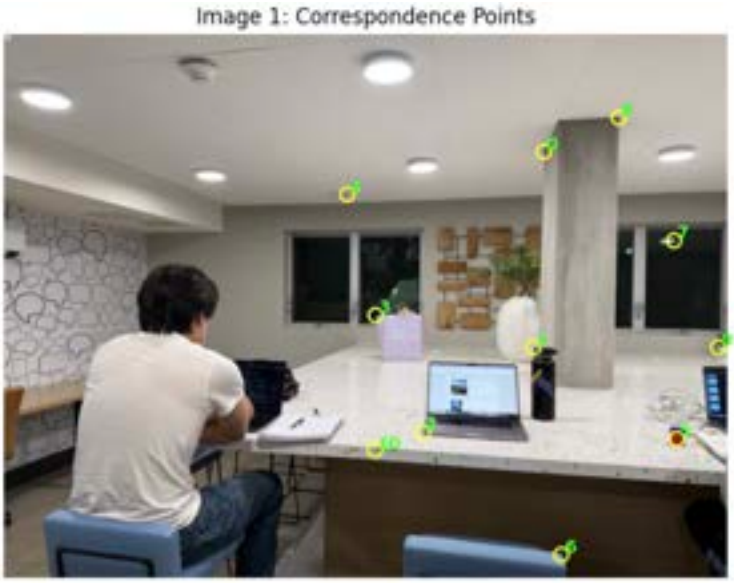
Athens, Greece

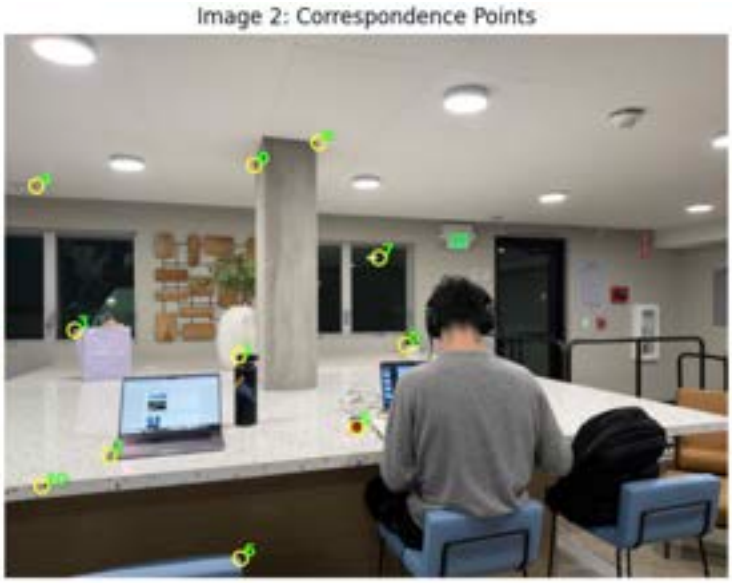
From the top of the Campanile

Part A.2



$$\begin{bmatrix} 1.23908710e+00 & 3.70198604e-01 & -1.45917469e+02 \\ -1.51962921e-01 & 1.49890322e+00 & -5.10552730e+02 \\ -1.56443141e-04 & 7.58403119e-04 & 1.00000000e+00 \end{bmatrix}$$





$$\begin{bmatrix} 1.24211398e+00 & 1.77163400e-01 & -8.41086661e+01 \\ -1.49857910e-01 & 1.50409374e+00 & -6.31019853e+02 \end{bmatrix}$$

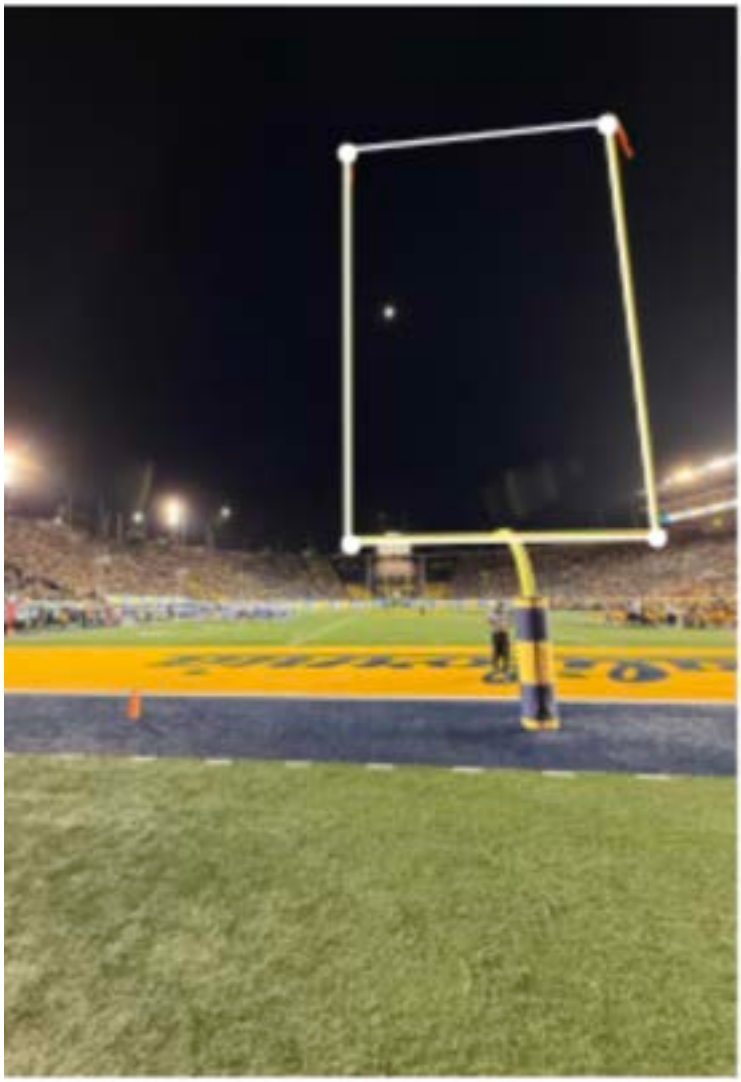
[-1.68089407e-04 5.32701565e-04 1.00000000e+00]]

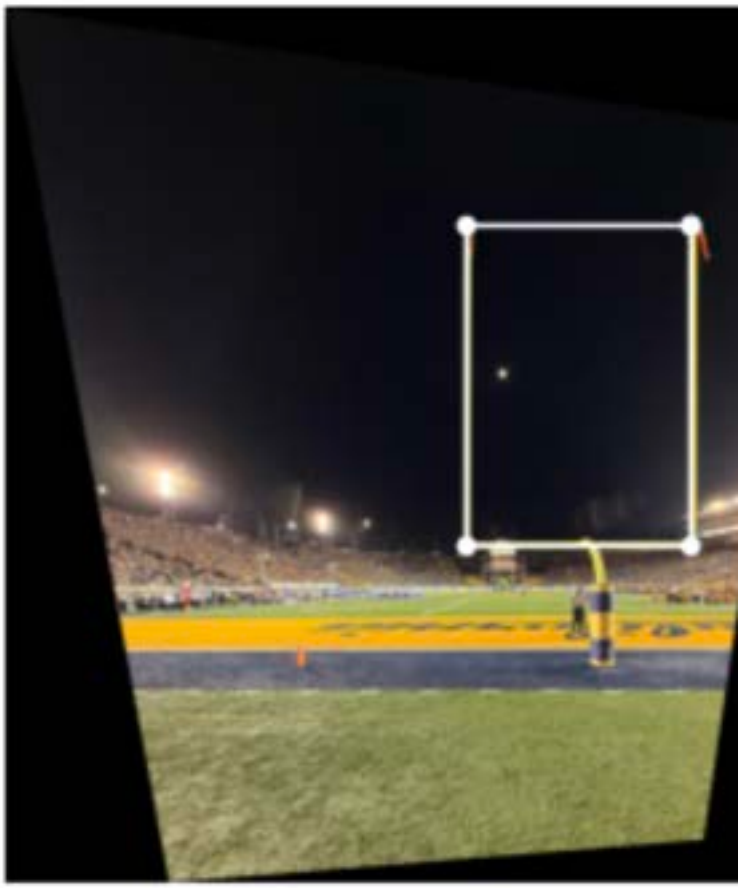
[[3.53942058e+00 2.75179444e+00 -1.38713074e+03]

[-1.82550780e-01 4.91495389e+00 -1.53011619e+03]

[-1.10431462e-04 5.17446530e-03 1.00000000e+00]]

Part A.3



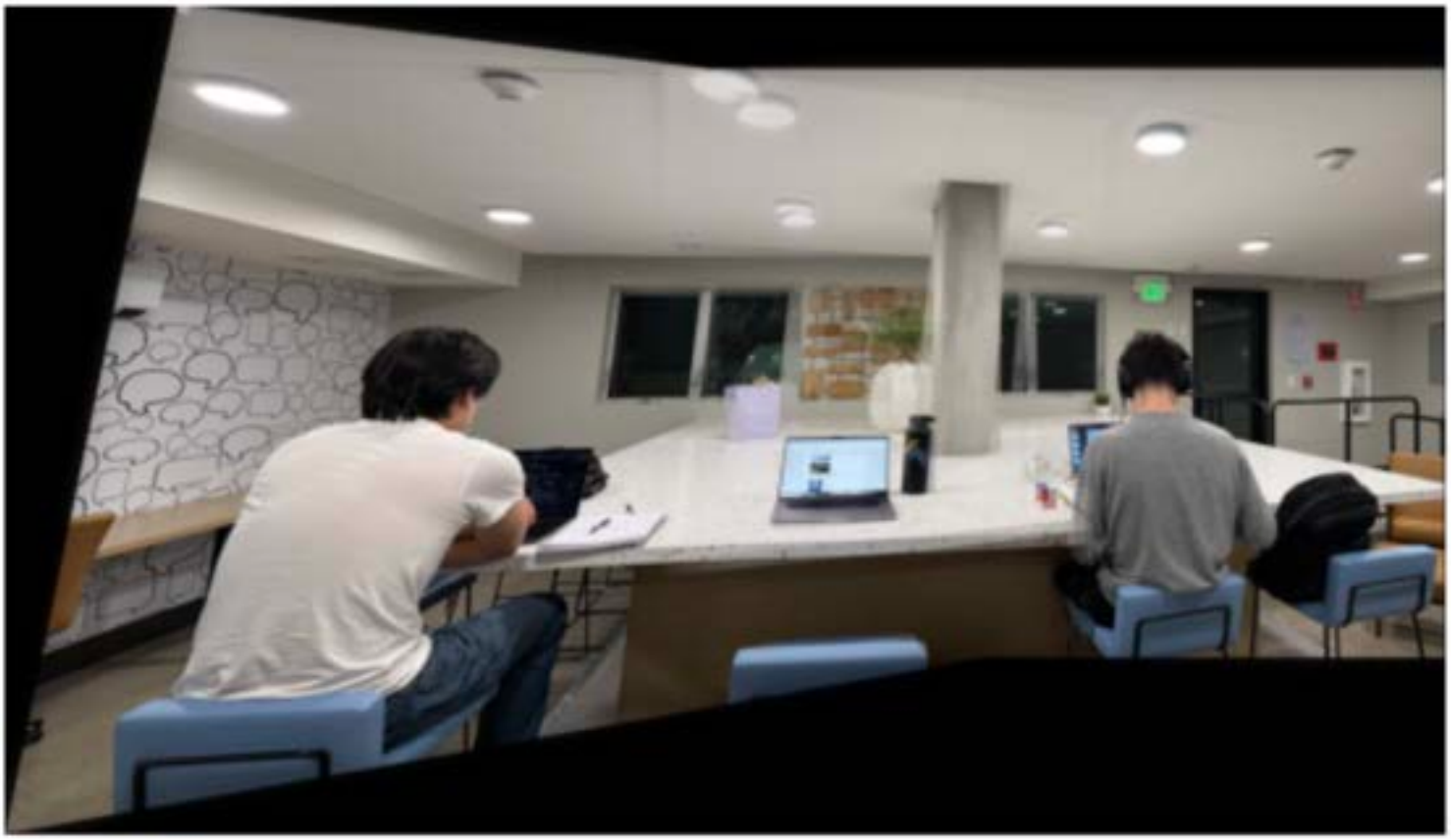


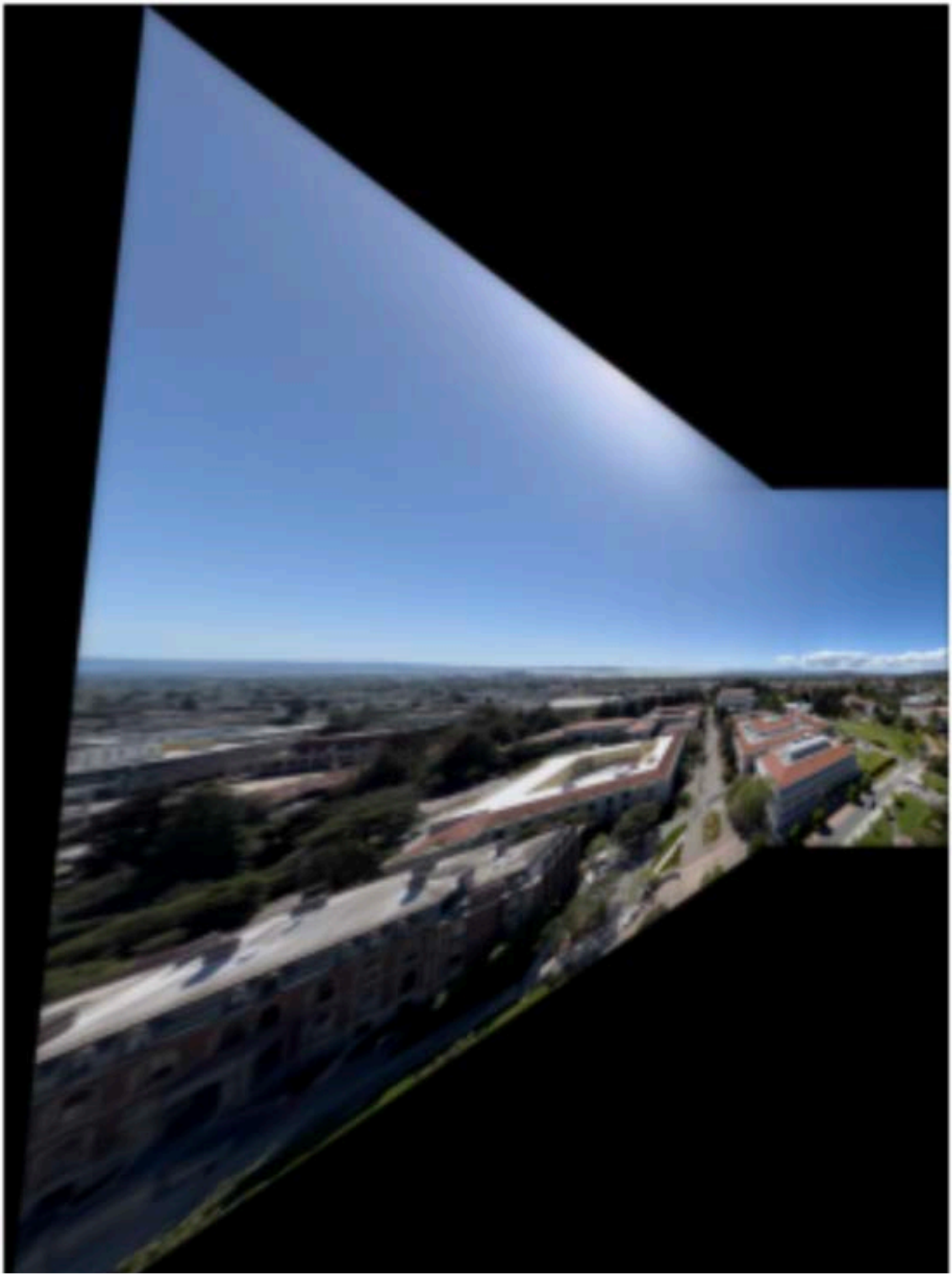
Stadium goalposts

Building

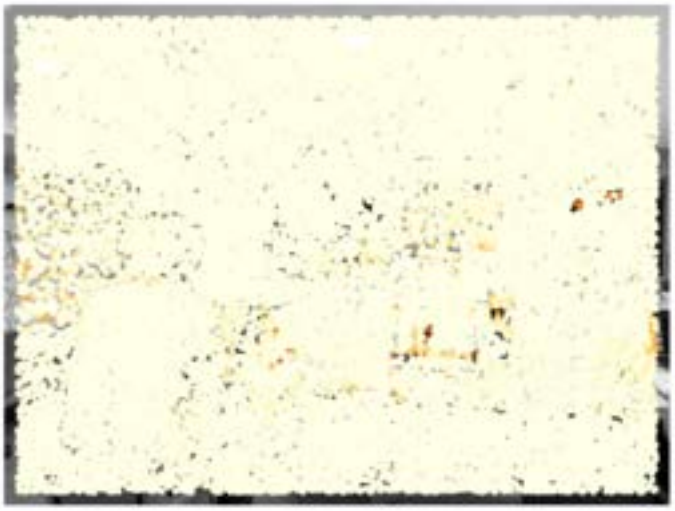
Part A.4

To create the mosaic, I first estimated the homography between the two images using the correspondence points from Part A2, aligning image 1 to image 2's coordinate frame. Each image was then inverse-warped using bilinear interpolation so that overlapping regions aligned. The warped images were placed together using their offsets in a shared buffer, where zeros indicated empty pixels. To blend, I computed image weight maps using a distance transform so that pixels farther from the image boundary contributed more, and weights were normalized to sum to 1 across all images. I then built Gaussian and Laplacian pyramids for both the images and their weight maps, blending each level with weighted sums. The blended pyramid was collapsed by upsampling and adding levels back together to reconstruct the final mosaic.

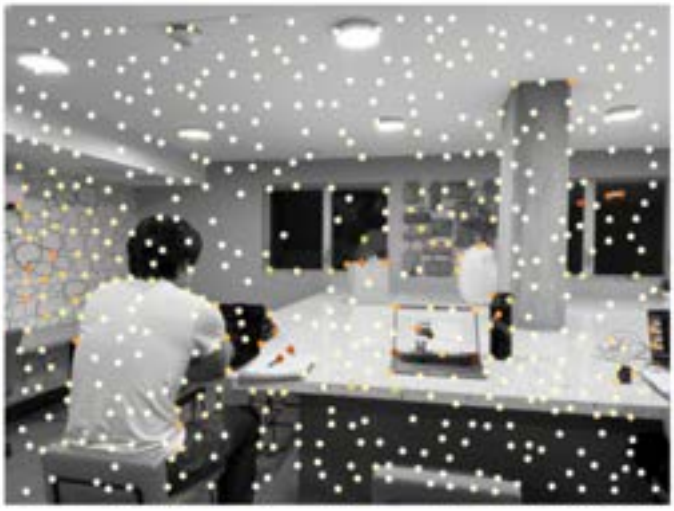
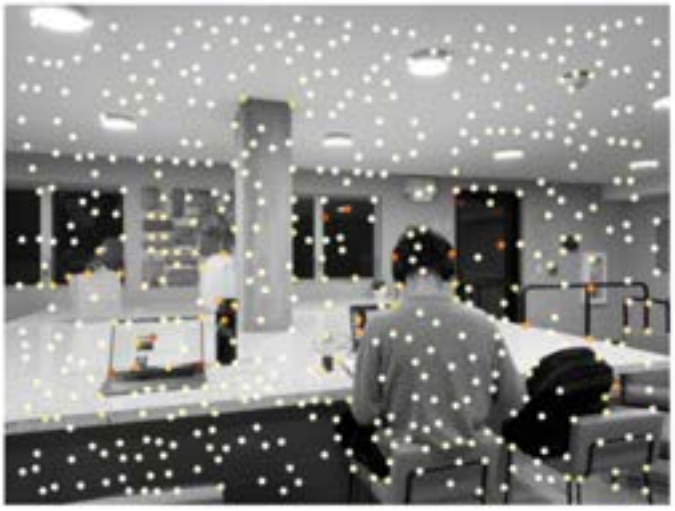




Part B.1

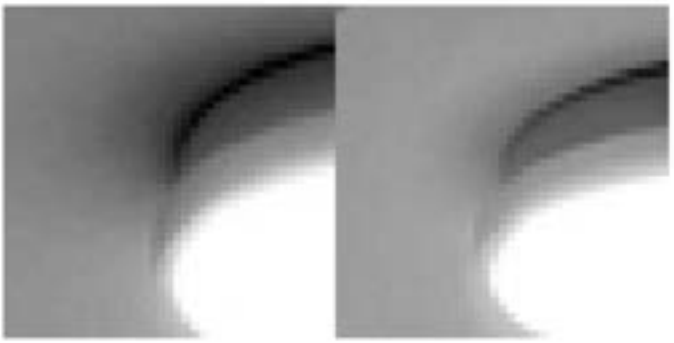
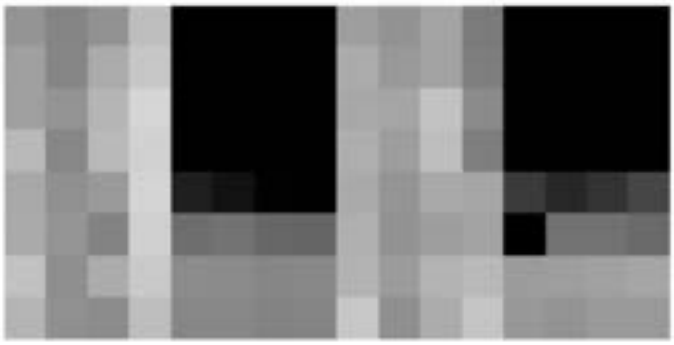
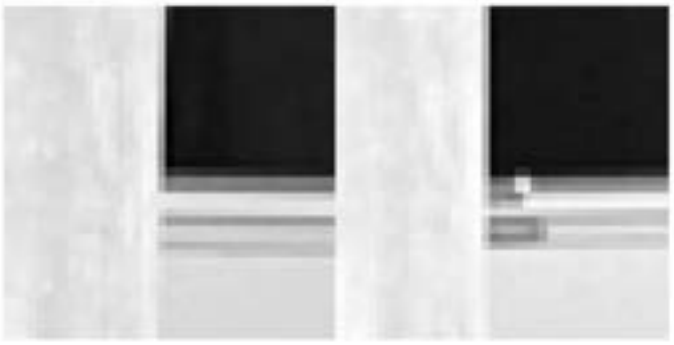



Without ANMS

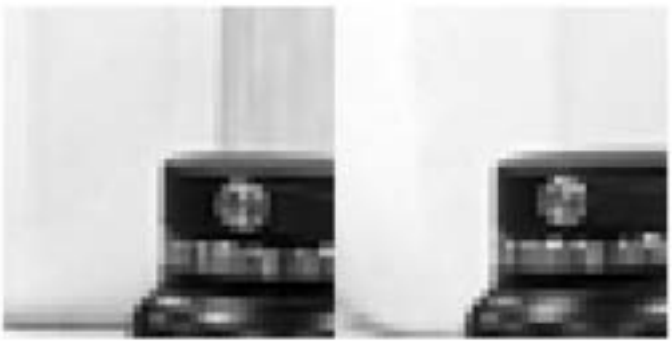



With ANMS

Part B.2

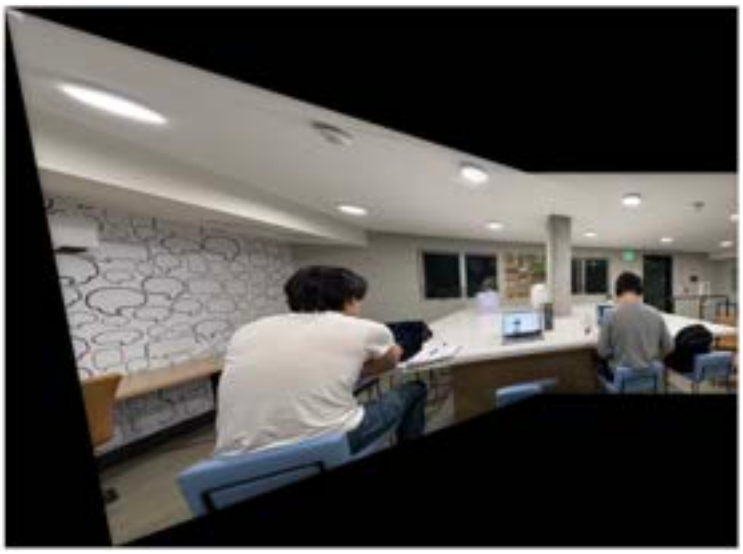




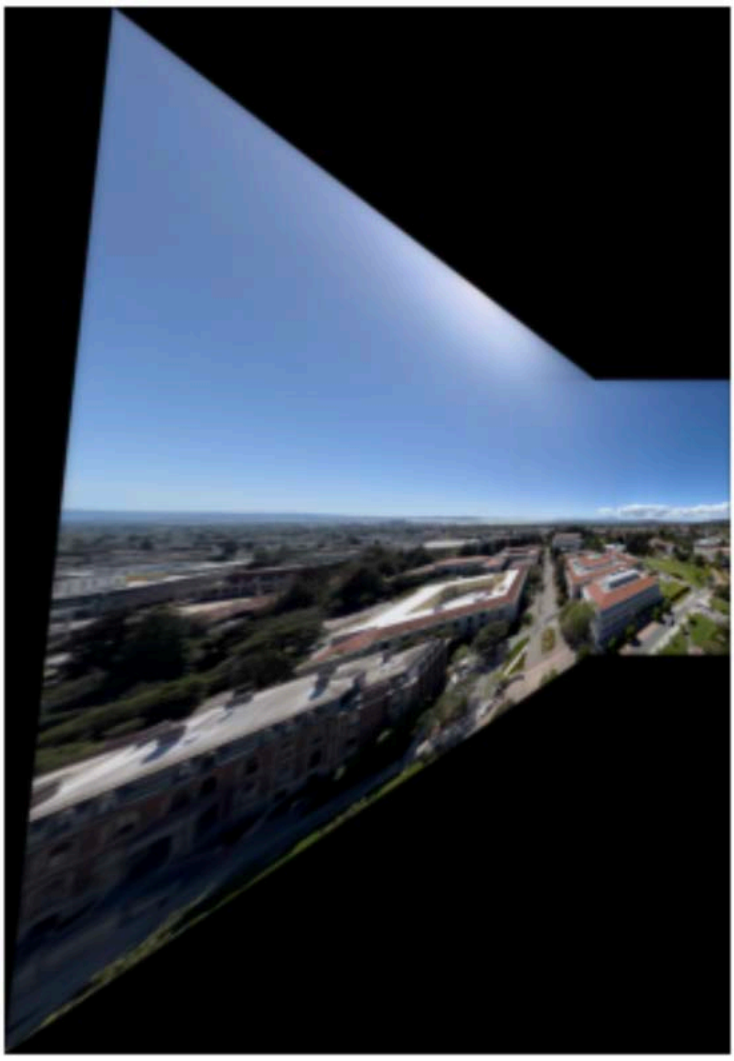
Part B.3

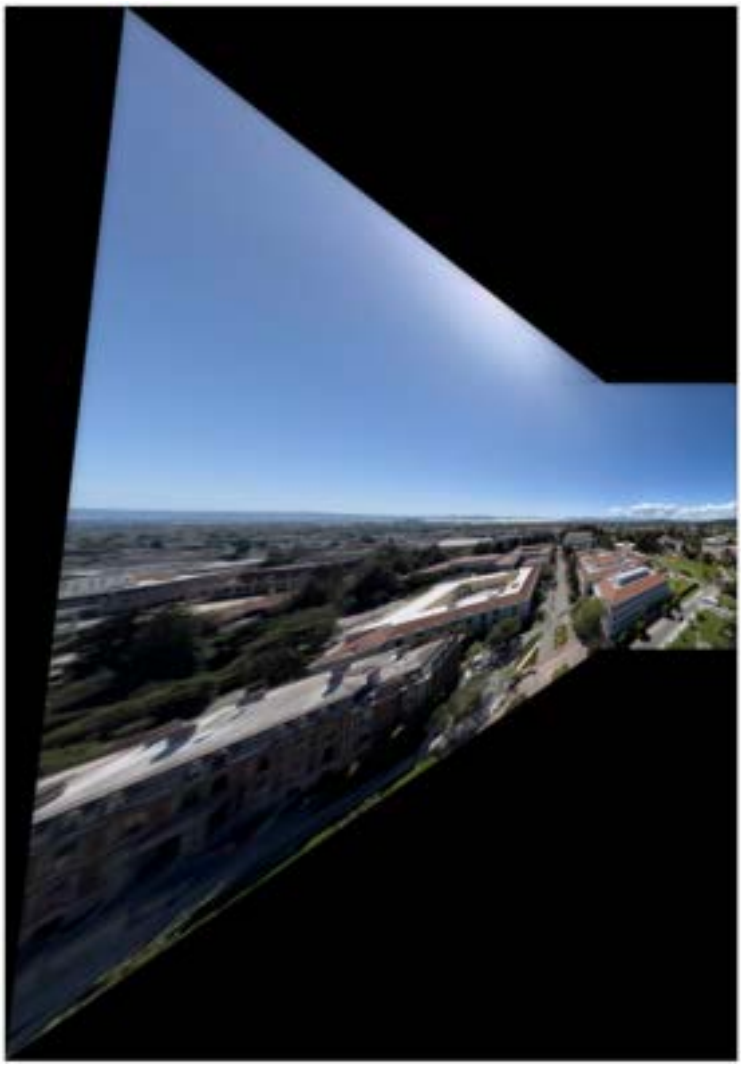
Part B.4

Manual vs. Automatic



Manual vs. Automatic





Manual vs. Automatic