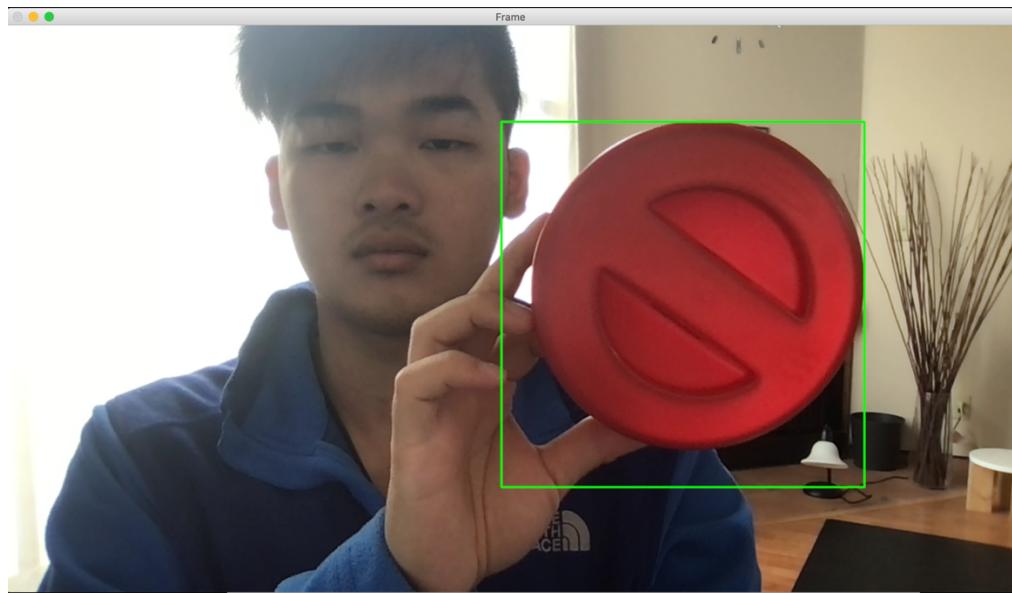
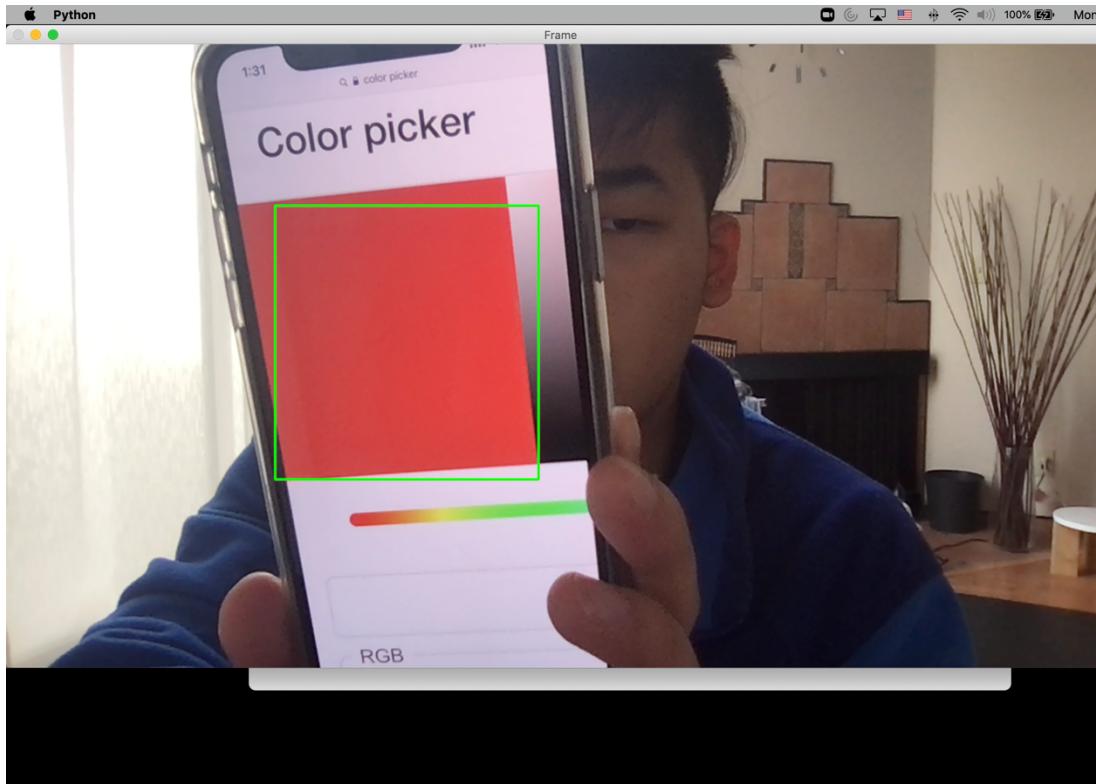


Task 4:

1. Choose something that is relatively monochromatic with a color different from your background surroundings (a water bottle, a piece of clothing). Try to create a video stream where you track this object with a bounding box surrounding it by thresholding HSV or RGB values. Is HSV or RGB typically better? How large is the threshold range that you need to track the object?
 - HSV is typically better for color detection. This could be because the HSV values of different shades of same color are numerically similar, while they are more different for RGB. The threshold I used to track a red object for HSV was ([0, 50, 20]) and ([5, 255, 255]), and for RGB it was ([120, 0, 0]) and ([255, 100, 100]).

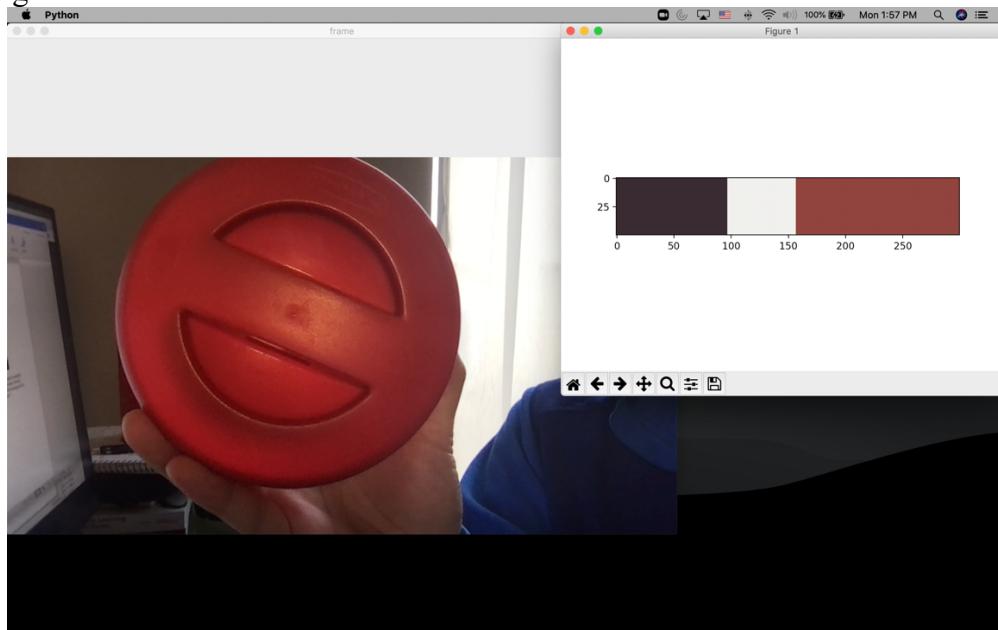


2. Now change the lighting condition (turn on or off the lights or turn on your phone flashlight on the object). Is there a major difference in the tracking ability of your object?
 - Tracking ability improves when there is light shining on the object. This is because the color becomes lighter and fits in the range specified better.
3. Now navigate to a Color Picker on your phone (Zoom into the color zone so that it covers a good portion of your phone screen). Since you can pick your color with the website, see if that is the color (with a small range) that you can pick up with your camera. Does changing your phone brightness help or hurt with how your code is able to track the color?
 - Increased brightness improves color detection by the same reason mentioned above.

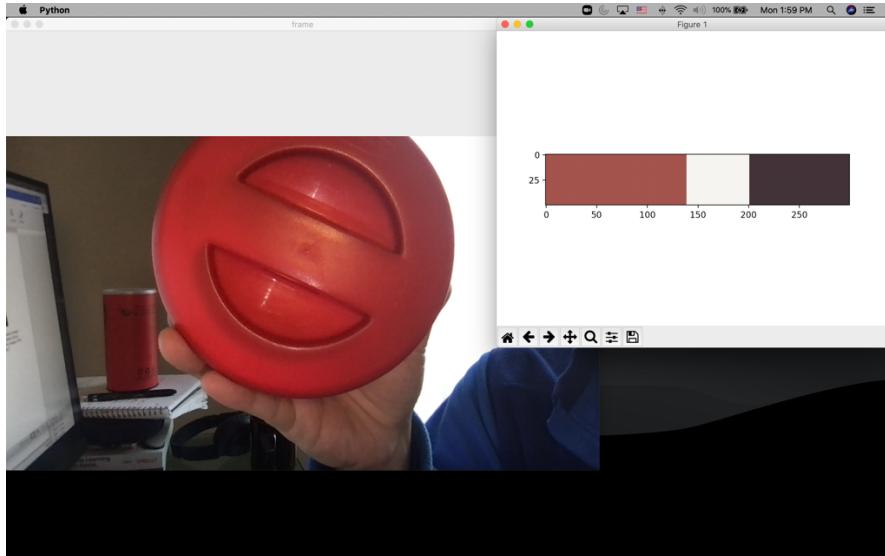


4. Create a new piece of code that can determine the “dominant” color in a designated (central) rectangle in your video feed (Use K-Means, see a tutorial to find an image’s dominant colors). Use your non-phone object and change the brightness of its surroundings. Note the change of the color. Do the same with your phone. Is one or the other more robust to brightness?

Without light

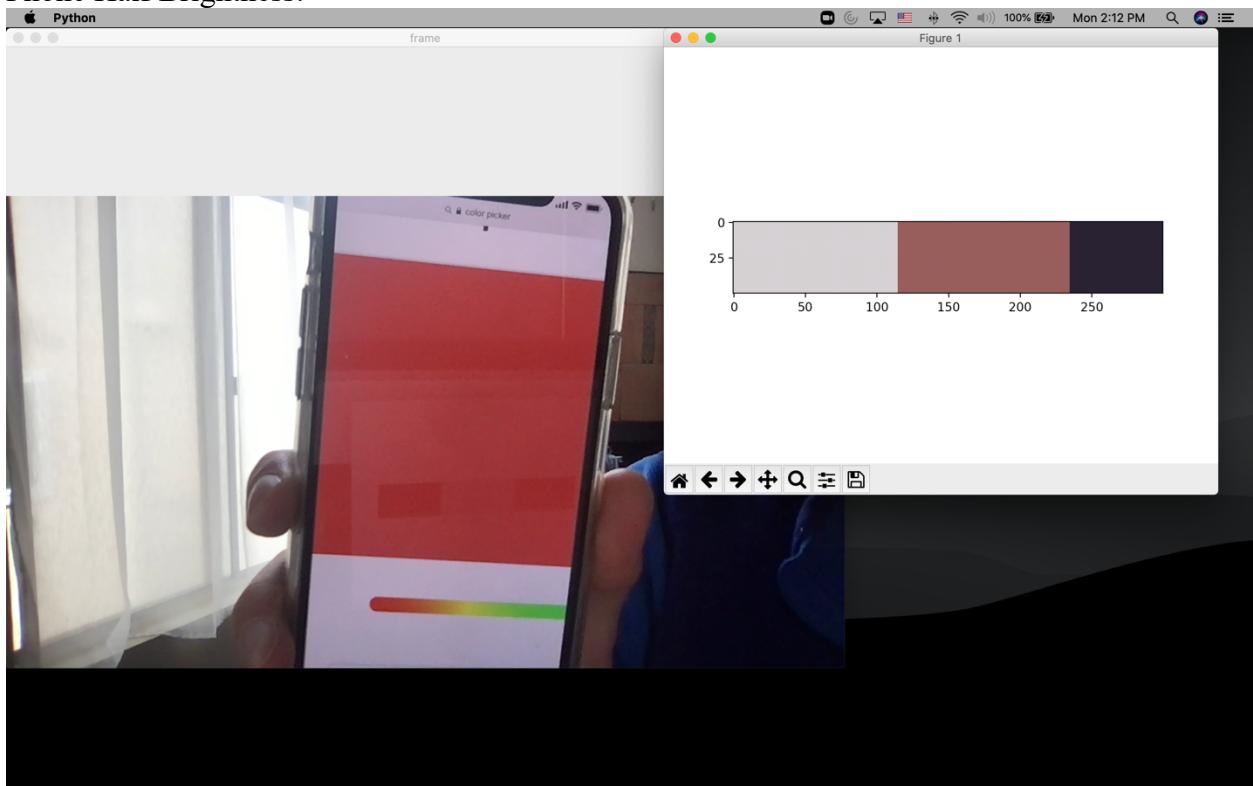


With light

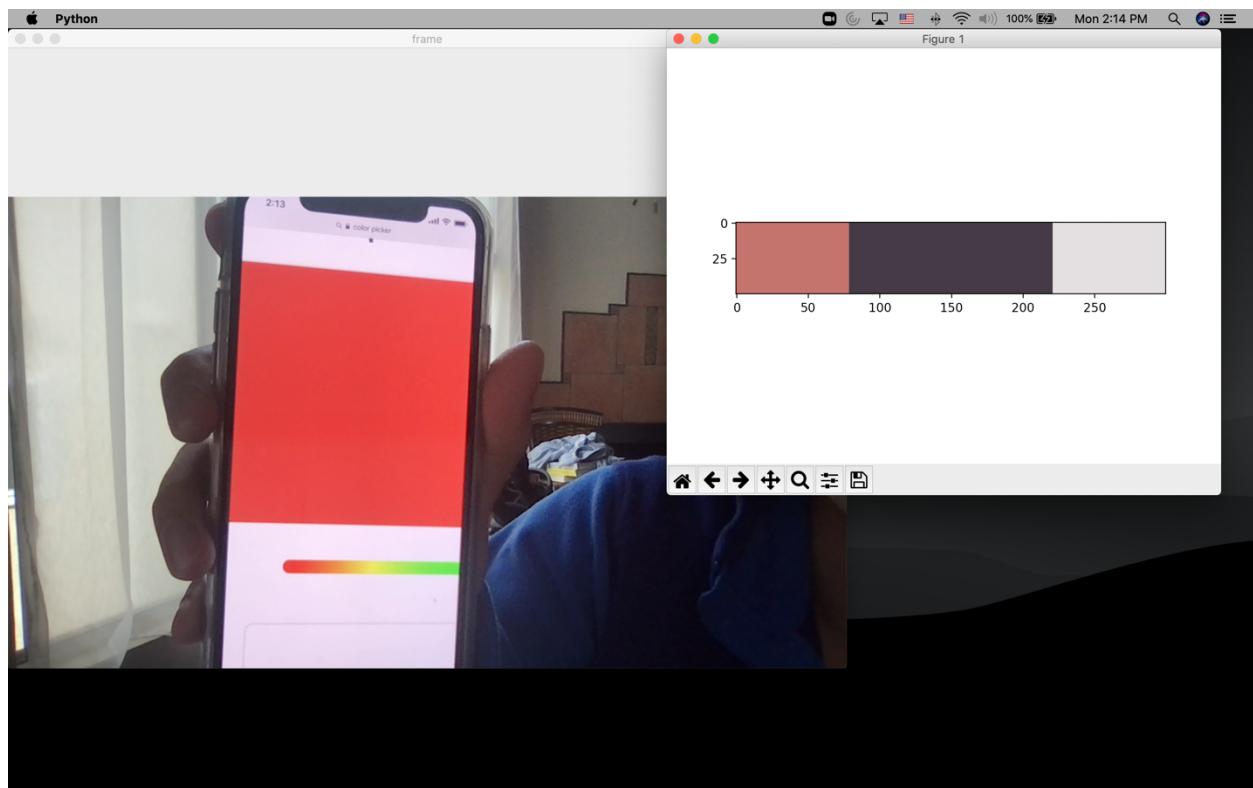


With light, the “Dominant Color” seems to be brighter. However, the level of dominance seems to stay the same. It could be because the red object covers small portion of the screen.

Phone Half Brightness:



Phone Full Brightness:



Like the red object test, increased brightness of red also changed the red color on the histogram. The dominance indicator also seems right, the red region is about 25% of the entire region.