**Module 6: Option #2**

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**Summary**

In this project we have applied several tactics to obtain an optimal adaptive threshold image that is able to highlight both objects when the lighting angle changes. We selected two objects, one lighter and the other darker. The goal of this project was to display both images with limited amount of background noise.

Adaptive thresholding is the process of segmenting an image by a defined block size and constant value to subtract the weighted sum or average of the block size by.

We began this project by reading in the image and displaying it, only to realize that the image was far too large for the screen. To account for this we set a parameter to resize each image to a smaller size. We then created an observable three-dimensional graph that displayed where the hue, saturation, and value to determine if the photo was dispersed enough to determine if the image was is optimal enough to create a segmented image. After normalizing the image, we were able to map out the image per the previous parameters. We reviewed each channel to see what they looked like to determine an appropriate path for thresholding. After determining an appropriate value for thresholding, we blurred the image a few times with different kernel values. We used OpenCV’s Gaussian Blur. The different values were used to smooth the image enough to apply an appropriate thresholding technique. For the adaptive thresholding, we tried both the adaptive mean and the Gaussian, the results showed that the Gaussian was superior in this instance. The mean thresholding showed more object retention in both images, however, there was also more noise remaining after the segmentation. I would suggest, depending on the goal of the program, that one may be better in certain aspects than the other. However, for this project, the Gaussian adaptive threshold removed the majority of background noise while keeping the outline of the objects. Both adaptive thresholding techniques used the same block size and constant values for a fair assessment of the two. As seen in the results below, although image 2 for both angles has a more vibrant outline, there is also more noise than we want for the result.





