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FIRE198: Autonomous Unmanned Systems

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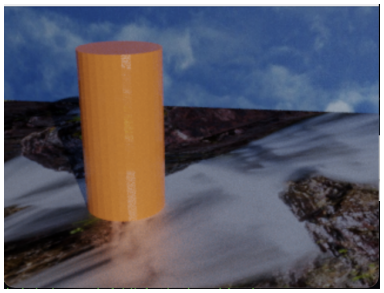
ASN3: How Does A Robot See The World?

1 late day used

Step 2:

1. The way you read and display an image that you downloaded is through using the cv2.imread() function.

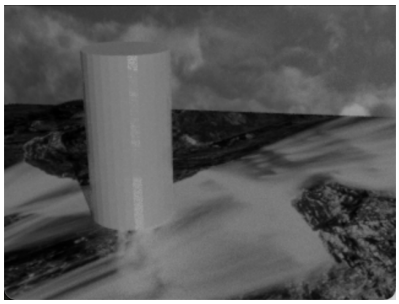


```
# Step 2

# Question 1 - How to read
img = cv2.imread('Frame0064.png')
cv2.imshow('First Image', img)
cv2.waitKey(2000)
```

```
-1
```

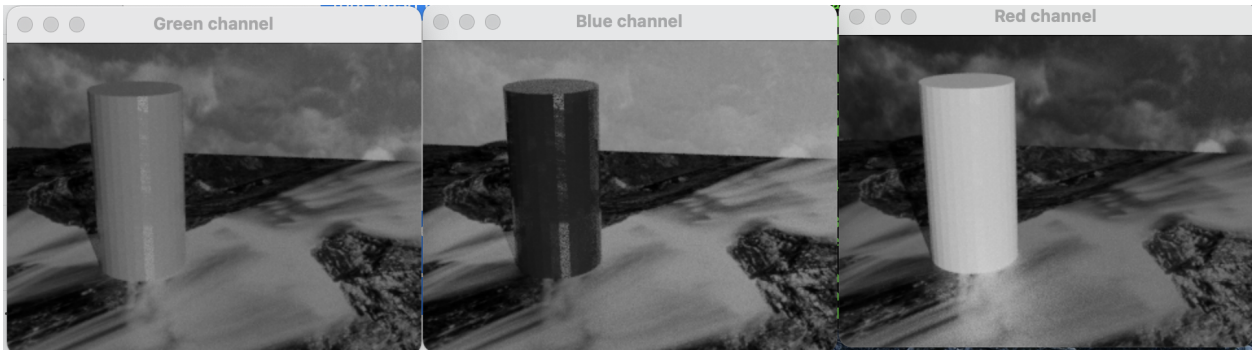
2. To read the image that we just downloaded as grayscale, use the cv2.imread(path_to_image, IMREAD_GRAYSCALE), which will make the image that we are importing as grayscale.



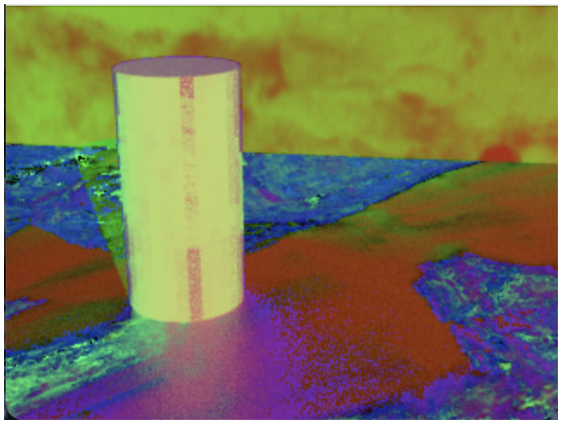
```
]: # Question 2 -
   Ig = cv2.imread('Frame0064.png', 0)
   cv2.imshow('First Image - Grayscale', Ig)
   cv2.waitKey(2000)
```

Step 3:

1. You read the color image through the cv2.imread() function, and you extract and display the RGB channels through using cv2.split(img). This will provide the matrices for R, G, and B.



2. The HSV image is a lot more saturated and seems overall “brighter” than the RGB image. HSV is better for robots than the other because it is easier to identify where edges are in an HSV color space.



Step 4:

1. The five factors that can make the same object color appear different on the captured image are:
    a. The range we specify isn't wide enough
    b. Different color spaces represent colors differently that don't translate exactly
    c. The brightness
    d. Saturation
    e. Contrast can make more colors look similar
2. The issues with the simple color thresholder I implemented in the previous step are that it doesn't identify the entire cylinder as orange, and it has some extra parts of the image that it classifies as orange.
3.
    a. It is better than the old method because it provides more definition of the cylinder than the other color spaces.

b. The issues in the second method include that it might not work as well when the brightness is lower and they can be fixed with auto-brightening the picture when we first open it by checking how much of the image was black or so.

4. I chose the HSL color space because there is more orange that can be picked than other color spaces. RGB would mean that orange would be in the middle of some other colors, but HSL allows us to pick more specific shades of orange.

Challenges I faced:

I thought a lot of functions I had to find by myself was kind of hard since a lot of different sources had a lot of different answers on how to do something. Other than that, I thought this was a cool assignment.