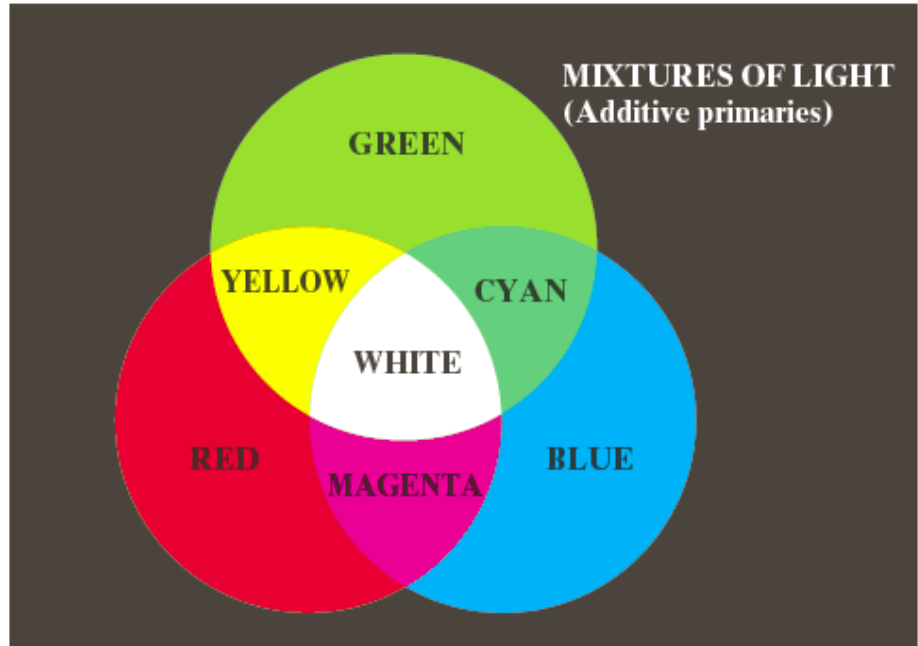


# Basics of Color

**Sung Soo Hwang**

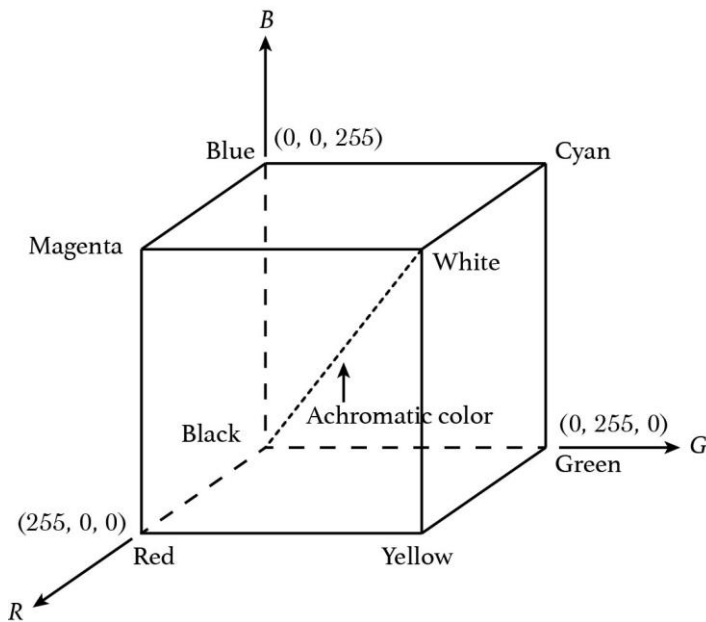
# Basics of Color

- Primary colors of light
  - Blue
  - Green
  - Red
- Secondary colors of light
  - Magenta (red plus blue)
  - Yellow (red plus green)
  - Cyan (green plus blue)
- Achromatic color
  - Without color
  - The ratio of each color component is same



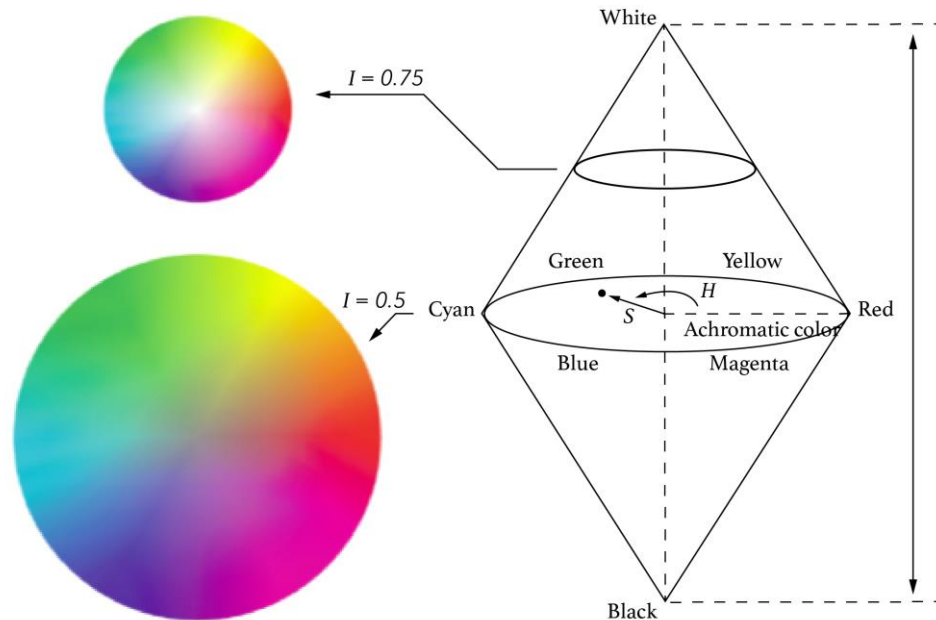
- RGB

- Consists of R-channel, G-channel, B-channel
- When intensity level of each channel is  $[0, 255]$ 
  - Red =  $(255, 0, 0)$
  - White =  $(255, 255, 255)$
  - Black =  $(0, 0, 0)$



- HSI
  - Consists of Hue-channel, Saturation-channel, and Intensity-channel
  - Intensity(Brightness): achromatic notion of intensity
  - Hue: the dominant wavelength in a mixture of light waves
  - Saturation: the relative purity or the amount of white light mixed
  - $HSI = HSV$
  - Large value of S → clear color
  - Large value of I → bright color

## ■ HSI



- Range of each channel?
  - $0 < H < 360$ , OpenCV range  $\rightarrow H/2 (0 < H < 180)$
  - $0 < S < 1$  , OpenCV range  $\rightarrow 255 * S (0 < S < 255)$
  - $0 < V < 1$  , OpenCV range  $\rightarrow 255 * V (0 < V < 255)$

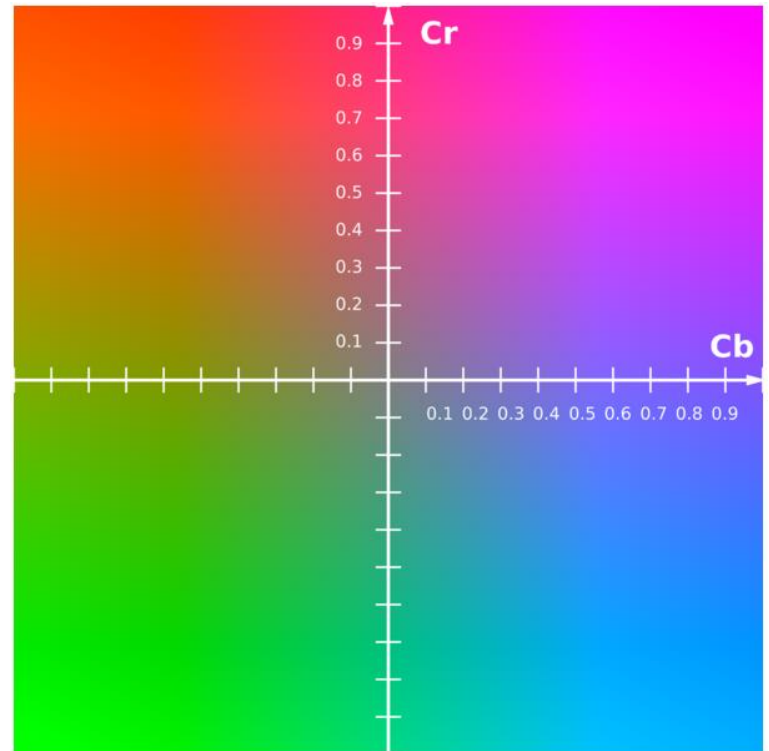
# Color Models

- YCbCr

- Y: Brightness
- Cb: Difference between blue value and brightness (B-Y)
- Cr: Difference between red value and brightness (R-Y)



<https://en.wikipedia.org/wiki/YUV#/media/File:Barn-yuv.png>



[https://en.wikipedia.org/wiki/File:YCbCr-CbCr\\_Scaled\\_Y50.png](https://en.wikipedia.org/wiki/File:YCbCr-CbCr_Scaled_Y50.png)

- Grayscale image
  - Hue and saturation of each pixel is equal to 0
  - The lightness(or brightness) is the only parameter of a pixel that can vary

