



Image Quality Enhancements

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NOTE



If you possess a previous version of this document, you may notice changes since the last publication, marked by a change bar which is a vertical line in the margin that visually identifies significant new or revised material.

Overview

Maintaining color accuracy between the input image and the output image is one of the most important and yet most elusive aspects of any digital photography system. For example, in an imaging system, the color values of the image displayed on the computer monitor will not necessarily match the color values of the image printed on the plastic card or badge.

Significant Considerations

Six essential elements need to be considered to produce a quality card or badge:

- Color Calibration
- Light Source
- Camera and Lens
- Capture Card
- Display
- Printer
- Digital Cameras

The sections that follow discuss each element.

Color Calibration

Peripherals such as cameras, lenses, capture cards, software compression tools, graphic displays, and printers each have a different set of color matching characteristics. This has given need to an industry-wide standard of color calibration known as CIE color space which is currently being developed. Without this standard, the other elements listed will need to compensate.

Light Source

Electronic cameras are programmed to balance at daylight color temperature (5900°K) which is the same temperature set for most film cameras. Therefore, traditional rules of balancing and mixing colors apply. For instance, using tungsten lights without filter compensation will result in a green cast, mercury vapor lights go blue-green, and sodium vapor lights go yellow.

NOTE



Recommendation: Use quartz-halogen lamps with a color temperature of 3200°K. The camera selected should have a White Balance Adjustment Switch for shooting under artificial light and color temperatures of approximately 3200°K. A reflective back light on a blue background is recommended for contrast and to avoid subject shadows. Front lamps should be reflected using a photographer's umbrella and placed at equal angles to avoid reflective hot spots on the subject's face.

Refer to Figure 1., Figure 2., and Figure 3. on the following pages for samples of a studio layout.

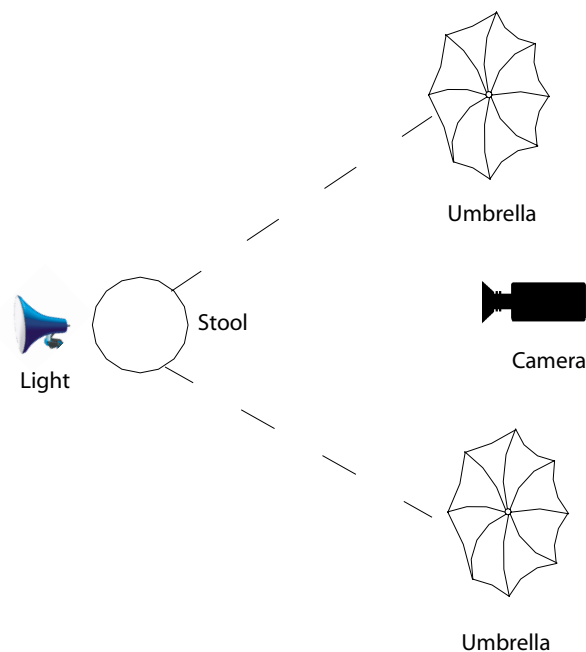


Figure 1. Top View of a Studio Layout

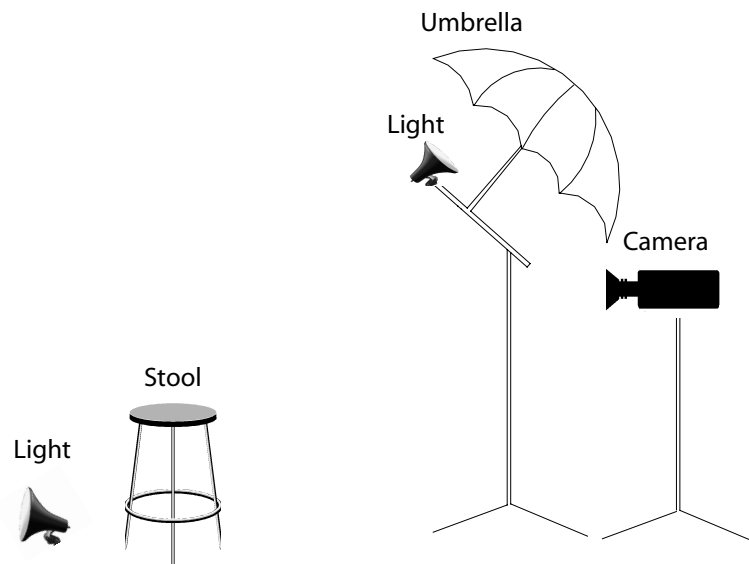


Figure 2. Side View of a Studio Layout

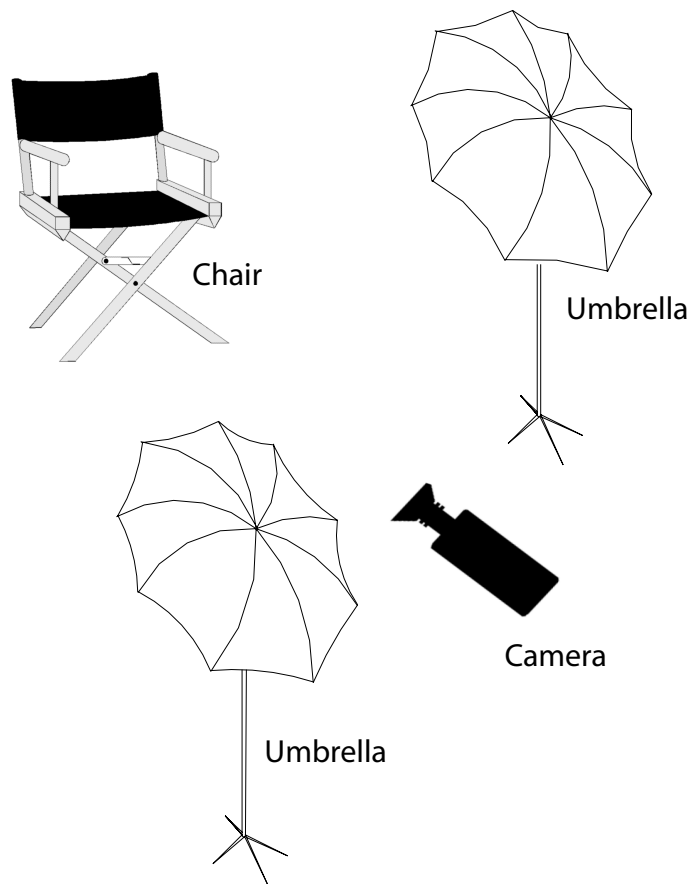


Figure 3. An Isometric View of a Studio Layout

Color correction can be made by filtering the source light or the camera lens, or adjusting the white balance setting. (Refer to the manual received with your camera regarding camera controls in the manual switch setting.) Although an image from an electronic camera can be instantly viewed on a monitor, monitors can be unreliable and inaccurate. While there are a number of ways an image can be improved, the best control over color is through lighting and camera filters.

Camera and Lens

The quality of video output from a camera is generally related to the number of pixels (picture elements) discernible by the camera's built-in sensor. The more pixels the camera can discern, the more detail it can provide. These built-in sensors are also used for color, sharpness, and brightness. The camera breaks the scene into solid-state sensors. These sensors are chips called CCD (Charged-Coupled Devices) that convert the brightness values of light into electrical signals which are then used by the capture card.

NOTE

RECOMMENDATION: A CCD camera with an array of at least 768(H) by 498(V) number of effective pixels and an RGB video signal output.



Capture Card

The capture card must convert the analog input signal from the camera (RGB, composite, or S-video) into a digital signal. The digital image is presented to the display in RGB digital signals. The capture card should have control parameters to adjust the input colors brightness, contrast and saturation. Saturation represents the purity of the color (for example, fire engine red is strongly saturated, red rust is not so saturated).

NOTE

RECOMMENDATION: A capture card with RGB input and SVGA (Super Video Graphics Adapter) output for the digital image reproduction.



Display

The color monitor displays on-tone correction which consists of three separate controls: brightness, contrast and gamma. Brightness affects all the pixels equally. Contrast affects the relationship between pixels, making an adjacent pixel, for example, brighter, while making another darker. Gamma correction is used to expand or contract certain tonal regions of an image, for example, to bring out shallow detail. These tools are for display only. The color monitor works in RGB color space and therefore the capture card can drive the display using the digitized RGB signal.

NOTE

RECOMMENDATION: An SVGA monitor with a minimum of 640 x 480 pixels and 256 colors per pixel.



Printer

The dye sublimation printer recreates the captured image on PVC cards. Printers do not use RGB color space. They use CMYK. CMYK is an acronym for the three subtractive colors used by the printing industry – Cyan, Yellow, Magenta, and Black. The printer driver must convert the RGB signals to CMYK and separate the colors. A separate image file is generated representing the tonal values for each of the CMYK components. The reason color printers require images in CMYK is that a piece of paper with no image on it is white. For an image to be printed, differing amounts of red, green, and blue must be subtracted from the paper. This is accomplished by adding the secondary or subtractive colors of cyan, magenta, and yellow.

NOTE

RECOMMENDATION: A 300 dpi (dots per inch) printer capable of printing up to 16 million colors.



Digital Cameras

Digital cameras offer an excellent alternative to the combination of video camera and capture card. Resolution is excellent; and when the digital still camera is used with the suggested studio lighting, images can be compared with the live video capture. Digital cameras have the advantage of portability and the ability to save captured images for

subsequent processing. This feature is excellent for remote capture and bringing the camera to the subject. There are some inherent drawbacks:

- The image quality cannot be viewed remotely unless the camera has a color LCD for playback.
- The input to the image system is generally through the serial port; and additional time is required to load the image to the system.
- A remote capture generally does not have a controlled background; and badge consistency cannot be maintained.
- The remote photographer must record the subject's demographic information for subsequent processing.