

systems **100**, and the computer **10652** may optionally be connected to the camera **10252** and the lighting systems **100**.

[0544] In embodiments it may be preferable to use small lighting systems **100** to highlight specific areas. For example, in portraiture, small LED-based lights can be used for highlights. Applications areas include fashion photography, cosmetics, beauty, hair, still photography and the like. Color is inconsistent from person to person, not just due to obvious ethnic differences. Facial coloring, mottled skin, hair and clothes can all dramatically affect lighting. As a result of individually controlled lighting systems **100**, lighting can be adjusted and customized for each person during the photo shoot.

[0545] In embodiments lighting systems **100** can be located in a variety of areas using clamps (spring clamps, toggle clamps, screw clamps and other standard clamping mechanisms) and other types of fastener mounting arrangements including hardware, adhesives, hook and loop fasteners and other fasteners.

[0546] Referring to **FIG. 104**, one way to provide for control and changes by the photographer or cinematographer is to provide for lighting control signaled from the camera **10252**, so that the camera **10252** directly communicates with and can control the lighting system **100**. In this way, camera settings can directly provide control and data input to the lights for color selection. This requires a means of communication between the camera (optionally connected to a signal source **8400**, such as a photosensor or other source of sensing and control) and the lighting system **100**. This can be accomplished via a communication link between the camera **10252** and the lighting control facility **3500**. The lighting control facility **3500** can either be integral to or separate from the lighting system **100**. The user interface may be one of several instantiations including: on-board camera menus, remote control, PC/serial/network interface (to camera and lights) and control both the lighting system **100** and the camera **10252**.

[0547] The camera **10252** or a second device **8400** can also provide sensor feedback about lighting settings and provide that information to the camera **10252**, the PC or a controller. Even the lighting units **102** themselves can have built-in sensing to adjust their light which can be adjusted due to the color and surfaces of the surroundings and the subject.

[0548] Thus the sensing element **8400** can be located in the camera **10252** (the imaging sensor or a separate sensing device such as a photocell or spectral radiometer), in a separate device **8400** or integral to the lighting system **100**. Eventually a standard camera signal interface can be used to signal and control lights. The sensing element **8400** can be built directly into the camera **10252** or provided as a separate device that communicates to the camera via a wired or wireless link. The advantage is that the imager is what receives the image and thus that is the point of imaging that should have that part of the feedback loop. However, the sensor **8400** can be independent of the camera **10252** and be a module that controls the camera **10252** or can be tied directly to the lighting control facility **3500** or to the lighting units **102** themselves. The sensor **8400** can provide detailed information that is based on an imaging sensor or a single scalar value that is representative of the scene. This information can be analyzed by known techniques to provide

color information at imaging resolution or a single value that represents the overall amount of light. The quantity of data is directly related to what is possible in the control of the lighting.

[0549] Referring again to **FIG. 102**, the subject **10254** is a painting with a woman looking towards the camera. The subjects **10254** may be lit, for example, by a small LED-based lighting unit **102**. This lighting would not be placed so as to be visible in the final picture. These smaller key lights could provide specific highlights, and multiple units could be placed so as to provide even lighting with consistent coloration as desired.

[0550] Correct color rendition of an image requires that the recording media such as the film or imaging elements and the light source match. For example, using Tungsten film under fluorescent lighting will result in an off-colored image due to the particular sensitivity of the film to the light spectrum. Indoor lighting is typically yellow-green, for example due to fluorescent spectra, and outdoor lighting is typically blue during the day. Cinema film is designed to be exposed with a particular balanced color temperature, typically around 3200°K. If illumination is dominated by a certain wavelength, then that color will dominate the scene. This is often undesirable, and color correction can correct for the proper colors and color balance in the image. With the digital imaging process and even film the use of digital LED-based lighting systems **100** makes correction possible before the image is captured.

[0551] In embodiments, lighting systems **100** can provide direct coupling of scene lighting and the camera **10252** to either adjust the camera color balance, or for the camera **10252** (or add-on device) to control the lighting to provide a color balancing function. While color correction is often provided in cameras **10252** (color balance or white balance) it is not typically tied to a lighting system **100** because, heretofore, lighting systems did not provide the level of control necessary to give accurate color control. White is also a color, and an adjustable LED-based high CRI white light source whose color temperature can be varied can provide similar control or feedback capability.

[0552] An example, not intended to be limiting in any way, may include a user interface to adjust color temperature of the LED-based lighting systems **100**. For example a dial and display, calibrated to provide an accurate and desired color temperature value can be used to set a particular color temperature for a shoot. Color temperature can be set independently for each fixture so as to provide a pleasing variation across the resultant image, or all units can be coordinated and synchronized to provide the same light color or color temperature. In addition, to provide some variation and bracket shots over time, the color temperature can be set to vary over time. Thus, the lighting colors and settings can be fixed to provide consistent color, to vary spatially or vary over time.

[0553] Making a photo shoot is often a balance of incremental changes to achieve the desired look. This often involves changes in the camera **10252**, lighting systems **100**, lenses, film (in the analog film case) or even afterwards, the use of post-production techniques to re-touch or edit photographic images. Even during shoots, photographers will often shoot instant film (such as Polaroid®) to test the set-up.