Claims

What is claimed is:

1. A method for controlling a lighting device to generate light of a desired natural scene, the lighting device comprising a plurality of warm white LEDs having a first intensity range and a plurality of cool white LEDs having a second intensity range, the method comprising:

dividing each of the first intensity range and the second intensity range into a predetermined number of intensity levels;

initializing the plurality of warm white LEDs to a first intensity level and initializing the plurality of cool white LEDs to a second intensity level, the first intensity level and the second intensity level being determined based on the desired natural scene;

iteratively adjusting at least one of the intensity level of the warm white LEDs or the intensity level of the cool white LEDs by at least one level in each iteration, until the light generated by the lighting device matches a desired correlated color temperature predetermined for the desired natural scene; and

iteratively adjusting at least one of the intensity level of the warm white LEDs or the intensity level of the cool white LEDs, until the light generated by the lighting device matches a desired illuminance predetermined for the desired natural scene.

2. The method of claim 1, further comprising:

determining a range of adjustable intensity levels for the warm white LEDs based on the desired natural scene, the range being from the first intensity level to a third intensity level, and

iteratively adjusting the intensity level of the warm white LEDs from the first intensity level towards the third intensity level by at least one level in each

iteration, until the light generated by the lighting device matches the desired correlated color temperature predetermined for the desired natural scene.

3. The method of claim 2, further comprising:

if the light generated by the lighting device does not match the desired correlated color temperature when the intensity level of the warm white LEDs is adjusted to the third intensity level,

determining a further range of adjustable intensity levels for the cool white LEDs based on the desired natural scene, the further range being from the second intensity level to a fourth intensity level, and

iteratively adjusting the intensity level of the cool white LEDs from the second intensity level towards the fourth intensity level by at least one level in each iteration, until the light generated by the lighting device matches the desired correlated color temperature.

4. The method of claim 3, wherein the desired natural scene is a blue sky scene having the desired correlated color temperature of about 10000K and having the desired illuminance of about 40000 lx.

5. The method of claim 4, comprising:

determining the first intensity level to be a level corresponding to a minimum intensity of the first intensity range,

determining the third intensity level to be a level corresponding to one fourth of a maximum intensity of the first intensity range, thereby forming the range of adjustable intensity levels for the warm white LEDs,

determining the second intensity level to be a level corresponding to a maximum intensity of the second intensity range,

determining the fourth intensity level to be a level corresponding to three fourth of the maximum intensity of the second intensity range, thereby

forming the further range of adjustable intensity levels for the cool white LEDs.

6. The method of claim 3, wherein the desired natural scene is a cloudy day scene having the desired correlated color temperature of about 7500K and having the desired illuminance of about 20000 lx.

7. The method of claim 6, comprising:

determining the first intensity level to be a level corresponding to half of a maximum intensity of the first intensity range,

determining the third intensity level to be a level corresponding to three eighth of the maximum intensity of the first intensity range, thereby forming the range of adjustable intensity levels for the warm white LEDs,

determining the second intensity level to be a level corresponding to half of a maximum intensity of the second intensity range,

determining the fourth intensity level to be a level corresponding to five eighth of the maximum intensity of the second intensity range, thereby forming the further range of adjustable intensity levels for the cool white LEDs.

8. The method of claim 3, wherein the desired natural scene is a mid-day scene having the desired correlated color temperature of about 5500K and having the desired illuminance of about 40000 lx.

9. The method of claim 8, comprising:

determining the first intensity level to be a level corresponding to three fourth of a maximum intensity of the first intensity range,

determining the third intensity level to be a level corresponding to three eighth of the maximum intensity of the first intensity range, thereby forming the range of adjustable intensity levels for the warm white LEDs,

determining the second intensity level to be a level corresponding to a minimum intensity of the second intensity range,

determining the fourth intensity level to be a level corresponding to half of a maximum intensity of the second intensity range, thereby forming the further range of adjustable intensity levels for the cool white LEDs.

10. The method of claim 1, further comprising:

when it is determined that the light generated by the lighting device matches at least one of the desired correlated color temperature or the desired illuminance, recording the current intensity level of the warm white LEDs and the current intensity level of the cool white LEDs.

11. The method of claim 1, further comprising:

when it is determined that the light generated by the lighting device matches the desired correlated color temperature,

adjusting the intensity level of the warm white LEDs by a first number of levels and adjusting the intensity level of the cool white LEDs by a second number of levels in each iteration, until the light generated by the lighting device matches the desired illuminance predetermined for the desired natural scene;

wherein a ratio of the first number to the second number is equal to a ratio of a maximum value of the first intensity range to a maximum value of the second intensity range.

12. The method of claim 11, further comprising:

comparing the desired illuminance with the illuminance of the light generated by the lighting device;

if it is determined that the illuminance of the light generated by the lighting device is higher than the desired illuminance, decreasing the intensity level of

the warm white LEDs by the first number of levels and decreasing the intensity level of the cool white LEDs by the second number of levels, or

if it is determined that the illuminance of the light generated by the lighting device is lower than the desired illuminance, increasing the intensity level of the warm white LEDs by the first number of levels and increasing the intensity level of the cool white LEDs by the second number of levels.

13. The method of claim 1, wherein the desired natural scene comprises one of a sunset scene, a sunrise scene, a blue sky scene, a cloudy day scene, or a mid-day scene.

14. The method of claim 1, further comprising:

if the desired correlated color temperature predetermined for the desired natural scene is equal to a correlated color temperature of the plurality of warm white LEDs,

initializing the intensity level of the plurality of warm white LEDs to a maximum level of the first intensity range, and

initializing the intensity level of the plurality of cool white LEDs to a minimum level of the second intensity range.

15. The method of claim 14, further comprising:

iteratively decreasing the intensity level of the warm white LEDs by at least one level in each iteration, until the light generated by the lighting device matches the desired illuminance predetermined for the desired natural scene.

16. The method of claim 14, wherein the desired natural scene is a sunset scene or a sunrise scene having the desired correlated color temperature of about 2400K and having the desired illuminance of about 580 lx.

17. The method of claim 1, further comprising:

after the lighting device is controlled to generate the light of the desired natural scene,

periodically or instantaneously monitoring at least one of the correlated color temperature or the illuminance of the light generated by the lighting device, and

repeating adjusting at least one of the intensity level of the warm white LEDs or the intensity level of the cool white LEDs, if it is monitored that the light generated by the lighting device does not match at least one of the desired correlated color temperature or the desired illuminance.

18. The method of claim 1, wherein the plurality of warm white LEDs and the plurality of cool white LEDs are arranged in a matrix form, wherein the warm white LED alternates with the cool white LED along each row and each column of the matrix.

19. A lighting control system for controlling a lighting device to generate light of a desired natural scene, the lighting device comprising a plurality of warm white LEDs having a first intensity range and a plurality of cool white LEDs having a second intensity range, the system comprising:

at least one sensor configured to detect at least one of a correlated color temperature or an illuminance of the light generated by the lighting device; and

at least one controller configured to control the lighting device, the at least one controller being configured to:

divide each of the first intensity range and the second intensity range into a predetermined number of intensity levels;

initialize the plurality of warm white LEDs to a first intensity level and initialize the plurality of cool white LEDs to a second intensity level,

the first intensity level and the second intensity level being determined based on the desired natural scene;

iteratively adjust at least one of the intensity level of the warm white LEDs or the intensity level of the cool white LEDs by at least one level in each iteration, until the light generated by the lighting device matches a desired correlated color temperature predetermined for the desired natural scene; and

iteratively adjust at least one of the intensity level of the warm white LEDs or the intensity level of the cool white LEDs, until the light generated by the lighting device matches a desired illuminance predetermined for the desired natural scene.