[DESCRIPTION]

[Title of Invention] LIGHTING CONTROL DEVICE, LIGHTING CONTROL SYSTEM, AND LIGHTING CONTROL METHOD

[Technical Field]

The present disclosure relates to a lighting control device, a lighting control system, and a lighting control method.

[Background Art]

Conventionally, there is disclosed a lighting control device that includes a human body detector that detects the presence of a human body within a detection area using an ultrasonic sensor, etc., and a controller that controls the light emission states of a plurality of lighting loads based on detection information from the human body detector (for example, see Patent Literature 1). This lighting control device is capable of providing an appropriate lighting environment according to the time period for which a person is present in the detection area.

[Citation List]

[Patent Literature]

[PTL 1]

Japanese Unexamined Patent Application Publication No. H10-125477

[Summary of Invention]

[Technical Problem]

When a conventional lighting control device is applied to a lighting apparatus that restores biorhythm by irradiating a person's body with light, the user is irradiated with high output light which tends to dazzle the user. Consequently, the user tends to forego treatment using light that restores biorhythm.

In view of this, embodiments of the present disclosure provide~~s~~ a

lighting control device, a lighting control system, and a lighting control method which are capable of reducing glare when a user undergoes treatment using light.

[Solution to Problem]

~~In order to achieve the above-described object, a lighting control device according to an aspect of the present disclosure is~~According to a first aspect of the present disclosure, there is provided a lighting control device that controls a light source according to a surrounding light amount detected by a light detector, and includes: a controller that determines, according to the surrounding light amount, an initial output value for output of light emitted by the light source, and a required time period to be taken for the output to rise from the initial output value and reach a target output value greater than the initial output value, and controls power to be supplied to the light source to cause the output to rise from the initial output value and reach the target output value over the required time period. The controller: sets the initial output value higher when the surrounding light amount is a second light amount than when the surrounding light amount is a first light amount, the second light amount being greater than the first light amount; and sets the required time period shorter when the surrounding light amount is the second light amount than when the surrounding light amount is the first light amount.

~~Furthermore, a lighting control system according to an aspect of the present disclosure includes~~According to a second aspect of the present disclosure, there is provided a light source that emits light, a light detector that detects a surrounding light amount, and the above-described lighting control device.

~~Furthermore, a lighting control method according to an aspect of the present disclosure is~~According to a third aspect of the present disclosure, there is provided a lighting control method of controlling a light source according to a surrounding light amount that is detected, and includes: determining, according to the surrounding light amount, an initial output value for output of

light emitted by the light source, and a required time period to be taken for the output to rise from the initial output value and reach a target output value greater than the initial output value, and controlling power to be supplied to the light source to cause the output to rise from the initial output value and reach the target output value over the required time period; setting the initial output value higher when the surrounding light amount is a second light amount than when the surrounding light amount is a first light amount, the second light amount being greater than the first light amount; and setting the required time period shorter when the surrounding light amount is the second light amount than when the surrounding light amount is the first light amount.

[Advantageous Effects of Invention]

According to embodiments of the present disclosure, it is possible to reduce glare when a user undergoes treatment using light.

[Brief Description of Drawings]

FIG. 1 is a block diagram illustrating a lighting apparatus including a lighting control device according to Embodiment 1;

FIG. 2 is a graph illustrating the relationship between brightness and object luminance as adaptation luminance;

FIG. 3 is a graph illustrating the relationship between adaptation luminance and brightness;

FIG. 4 is a graph illustrating the relationship between output of light emitted by a light-emitting module and a required time period;

FIG. 5 is a diagram illustrating a positional relationship between an observer and a lighting apparatus;

FIG. 6 is a table indicating UGRs for indirect illuminance;

FIG. 7 is a diagram illustrating the relationship between environmental illuminance and the required time period;

[CLAIMS]

[Claim 1]

1. A lighting control device that controls a light source according to a surrounding light amount detected by a light detector, the lighting control device comprising:

a controller that determines, according to the surrounding light amount, an initial output value for output of light emitted by the light source, and a required time period to be taken for the output to rise from the initial output value and reach a target output value greater than the initial output value, and controls power to be supplied to the light source to cause the output to rise from the initial output value and reach the target output value over the required time period, wherein

the controller:

sets the initial output value higher when the surrounding light amount is a second light amount than when the surrounding light amount is a first light amount, the second light amount being greater than the first light amount; and

sets the required time period shorter when the surrounding light amount is the second light amount than when the surrounding light amount is the first light amount.

2. The lighting control device according to claim 1, wherein

the controller causes an amount of change in the output to increase over time.

3. The lighting control device according to claim 2, wherein

the controller causes the amount of change in the output to increase

over time, using an exponential function.

4. The lighting control device according to any one of claims 1 to 3, further comprising:

an input unit that receives, by way of an input operation by a user, input of at least one of the initial output value, the required time period, and a useable time period for which the user uses the lighting control device, wherein

the controller has a first mode in which the initial output value and the required time period are determined according to the surrounding light amount detected by the light detector, and a second mode in which the initial output value, the required time period, and the usable time period are selectively determined according to an initial output value, a required time period, and a usable time period inputted, by way of the input operation by the user, via the input unit.

5. The lighting control device according to claim 4, wherein

in the second mode, the input unit further receives an option selected from among a plurality of options obtained by dividing surrounding brightness into a plurality of levels, and

the controller controls the power to be supplied to the light source according to the option inputted via the input unit, to cause the output to rise from the initial output value and reach the target output value over the required time period.

~~6. The lighting control device according to any one of claims 1 to 5, wherein~~

~~when the light emitted by the light source has a unified glare rating~~

(UGR) of 22, an indirect illuminance at a position of eyes of an observer is less than or equal to 900 lx.

7. The lighting control device according to any one of claims 1 to 6, wherein

the surrounding light amount and the required time period have a relationship indicated by a monotonically non-increasing function.

8. The lighting control device according to any one of claims 1 to 7, wherein

when a light exposure amount which is an amount of light a user is exposed to does not satisfy a daily required light exposure amount, the controller sets the required time period shorter as a difference between the light exposure amount and the daily required light exposure amount is bigger.

9. A lighting control device that controls a light source according to a surrounding light amount detected by a light detector, the lighting control device comprising:

a controller that determines, according to the surrounding light amount, an initial output value for output of light emitted by the light source, and a required time period to be taken for the output to rise from the initial output value and reach a target output value greater than the initial output value, and controls power to be supplied to the light source to cause the output to rise from the initial output value and reach the target output value over the required time period, wherein

the controller sets the initial output value higher and the required time period shorter as the surrounding light amount is bigger.

~~10~~6. A lighting control system, comprising:

a light source that emits light;

a light detector that detects a surrounding light amount; and

the lighting control device according to any one of claims 1 to ~~9~~5.

~~11~~7. A lighting control method of controlling a light source according to a surrounding light amount that is detected, the lighting control method comprising:

determining, according to the surrounding light amount, an initial output value for output of light emitted by the light source, and a required time period to be taken for the output to rise from the initial output value and reach a target output value greater than the initial output value, and controlling power to be supplied to the light source to cause the output to rise from the initial output value and reach the target output value over the required time period;

setting the initial output value higher when the surrounding light amount is a second light amount than when the surrounding light amount is a first light amount, the second light amount being greater than the first light amount; and

setting the required time period shorter when the surrounding light amount is the second light amount than when the surrounding light amount is the first light amount.