

METHOD AND DEVICE FOR EMULATING A HEADLAMP THAT IS PARTIALLY COVERED BY A MASK

Field of the invention

5 The invention relates to a method for emulating a spotlight that is partially covered by a mask.

Description of the prior art

To generate atmospheric light beams, it is known in the field of event technology to control head-mounted spotlights or scanners using a lighting control protocol via lighting control consoles. In addition to deflecting the light beam, it is also possible
10 to change the brightness of the light beam emerging from the spotlight, as well as its color with the aid of color change systems or its shape with the aid of masks. The advantage here is that all spotlights can be operated via a uniform control system, making it easy to implement even complex lighting scenarios with many light sources. However, not least because of the physical limitations of the
15 spotlights used in this process in terms of limited actuating speeds and travels and in terms of a limited selection of colors and shapes specifically predefined for each application, users are restricted in their lighting design options because only settings predefined in the spotlights can be called up via the lighting technology control protocol.

20 Summary of the invention

The invention is thus based on the object of creating a method of the type described at the beginning which, while retaining existing lighting control protocols, makes it possible to implement a lighting design independent of any presettings in the spotlights using inexpensive and readily available lighting components.

The invention solves the set object in such a way that a two-dimensional pattern is retrieved from a pattern memory as a function of a pattern channel value of a lighting control protocol and is transformed as a function of transformation channel values of the lighting control protocol, after which the transformed pattern is
5 converted into a raster image, the pattern pixels of which raster image are brighter by at least 20% than the remaining pattern-free pixels, and the raster image is output as a via a digital projector acting as a spotlight.

As a result of these features, on the one hand, it is possible to control commercially available digital projectors on the basis of standardized light control
10 protocols which do not have to be adapted for this purpose and can therefore be used unchanged, and on the other hand, it is possible to transform various light parameters such as brightness, shape and color of the light beam emitted by the projector in real time. For example, light control protocols according to the ArtNet standard, the DMX512 standard or similar can be used. In order to transform the
15 patterns retrieved from the pattern memory with regard to their brightness, shape, color, etc. in terms of simple controllability, separate bus channels can be provided for the transformation channel values. The raster image can be composed additively of the transformed pattern and a background image with lower brightness, preferably a black image area. In that pattern pixels of the output raster
20 image are at least 20%, preferably at least 50%, brighter than the remaining pattern-free pixels, a delineated spotlight beam can be perceived by viewers through the projected raster image. In order to provide the user with transitions between different projected raster images that are perceived as natural, following the delays that occur when changing physical masks in the context of conventional
25 lighting technology systems, an interpolation between the channel values can be performed when changing between two values of a channel of the lighting control protocol, wherein interpolated channel values are used for the transformation for each time step of a predetermined time interval and a raster image generated on the basis of the interpolated channel values is output.

30 In order to allow an even greater creative freedom of the lighting scenarios while maintaining an easy controllability of the projector, several pattern channels each

assigned to one image plane can be provided, wherein the transformed patterns of the individual image planes are converted into a common raster image. In this way, for example, several basic patterns can also be adapted and superimposed in planes to generate the generated image. In this case, the individual patterns are transformed independently of each other using the transformation channel values assigned to the respective image plane and then mixed to form a common sum image by combining the individual planes. Each plane is therefore assigned a pattern channel for selecting a pattern from the pattern memory and one or more transformation channels which together define the partial image of the plane.

10 In the event that several raster images are output via one digital projector each, wherein the respective digital projectors are acting as spotlights, it must be ensured that synchronous image output is possible despite possibly different reaction times of the individual projectors. This is particularly necessary when different, readily available projectors that are not coordinated with each other are used. With this in mind, it is proposed that the raster image signal for one projector is delayed by the difference between the slowest reaction time of all projectors and the reaction time of the one projector. The delay value required for this can, for example, also be transferred to the device according to the invention via a channel of the lighting technology control protocol.

20 The invention also relates to a device for emulating a spotlight partially covered with a mask, having an input for a lighting control protocol, wherein a pattern memory for two-dimensional image patterns and an image mixer connected to the pattern memory and controlled as a function of the channel values of the lighting control protocol are provided, the sum image output of which image mixer is connected to the image input of a digital projector acting as a spotlight. The image mixer can preferably have different inputs corresponding to the pattern parameters, such as a pattern size input, a pattern positioning input, a pattern brightness input or a pattern color input. The device according to the invention can be controlled with conventional lighting control consoles via common lighting control protocols, such as DMX512 or ArtNet, so that lighting scenarios can be transformed in real time by the image mixer depending on the channel values of

the lighting control protocol. It is essential that the raster image is not prefabricated and stored in a memory, but is calculated and output in real time by the image mixer, which can be a graphics card, for example. This means that transformation channels can also be provided whose channel value specifies a particular
5 animation of the pattern without the channel value having to change continuously for this animation. In this way, animations such as a rotation, translation, scaling, or even a blur that changes over time can be calculated in high quality without delay, regardless of the transmission conditions on the lighting control bus. To achieve good illumination results, it is recommended that the digital projector has a
10 luminous intensity of at least 3000 ANSI lumens. The contrast ratio of the projector can preferably be at least 5000:1.

In order for the image output by the digital projector to be perceived by viewers as a delineated beam, as would be output by conventional spotlights, it is recommended that the difference in brightness between pattern pixels and pattern-
15 free pixels in the sum image output be at least 20%, preferably at least 50%.

In order to further increase the diversity of different lighting scenarios that can be transformed in real time, the device can have several pattern channel inputs for the lighting technology control protocol, wherein each pattern channel input is assigned an image plane mixed with the sum image of the image mixer. This
20 allows the user to perform creative lighting designs due to the plurality of planes that can be combined with each other to form a sum image, each with different transformation values. The image mixer can also have one or more transformation channel inputs for the lighting control protocol for each image plane. In addition, the image mixer can have one or more plane-independent transformation channel
25 inputs that allow the sum image to be transformed before it is output.

Brief description of the invention

In the drawing, the subject matter of the invention is shown by way of example in a schematic block diagram.

Detailed description of the preferred embodiments

A device for carrying out a method according to the invention for emulating a spotlight partially covered with a mask has an input 1 for a lighting technology control protocol. A bus interface 2 may be provided which, on the one hand, receives control signals from a control unit 3, e.g. a lighting control panel, and, on the other hand, connects a pattern memory 4 for two-dimensional image patterns to an image mixer 5 in such a way that the latter can be controlled as a function of the channel values of the lighting control protocol. The image mixer 5 has a sum image output 6 which is connected to the image input 7 of a digital projector 8 acting as a spotlight, so that the sum image 9 generated in the image mixer 5 as a function of the channel values of the lighting control protocol can be output via the digital projector 8.

To generate a sum image 9, two-dimensional patterns are retrieved from the pattern memory 4 as a function of the respective pattern channel values of the lighting control protocol and transformed in real time in the image mixer 5 as a function of transformation channel values of the lighting control protocol. The image mixer 5 may be a graphics card for this purpose.

As shown by way of example in the drawing, the image mixer 5 can have a number of pattern inputs 10, 11, 12 via which patterns can be loaded from the pattern memory 4 into the individual image planes 13, 14, 15 using the bus interface 2 on the basis of the channel values of the pattern channels. Each pattern channel input and each pattern input 10, 11, 12 is assigned an image plane 13, 14, 15 which is mixed with the sum image 9. The transformation of the respective patterns of each image plane 13, 14, 15 supplied to the image mixer 5 via the pattern inputs 10, 11, 12 takes place as a function of transformation channel values which are transferred to the image mixer 5 via corresponding transformation channel inputs 16, 17, 18. In addition, the image mixer 5 can have, for example, a plane-independent transformation channel input 19, which enables the sum image 9 to be transformed before it is output. In the exemplary embodiment shown here, the image plane 13 can be a black pattern as a

background plane. For example, a channel value is specified via the transformation channel input 17 assigned to the image plane 14 in order to calculate a scaling of the pattern 20 in the image plane 14. Similarly, channel values can be specified via the transformation channel inputs 16, 18 assigned to the remaining image planes 13, 15, which, for example, cause a rotation of the pattern 21 or a change in the width/length ratio of the pattern 21. Finally, the plane-independent transformation channel input 19 can be used to specify a channel value which, for example, causes a blurring of the sum image 9 combined from the respective transformed image planes 13, 14, 15 before it is output via the sum image output 6.

CLAIMS:

1. Method for emulating a spotlight partially covered with a mask, characterized in that a two-dimensional pattern is retrieved from a pattern memory (4) as a function of a pattern channel value of a lighting control protocol and is transformed as a function of transformation channel values of the lighting control protocol, after which the transformed pattern is converted into a raster image, the pattern pixels of which raster image are brighter by at least 20% than the remaining pattern-free pixels, and in that the raster image is output via a digital projector (8) acting as a spotlight.
2. Method according to claim 1, characterized in that a plurality of pattern channels are provided, each of which are assigned to an image plane , and in that the transformed patterns of the individual image planes (13, 14, 15) are converted into a common raster image.
3. Method according to claim 1 or 2, characterized in that a plurality of raster images are output via one digital projector each acting as spotlight and in that the raster image signal for one projector is delayed by the difference between the slowest reaction time of all projectors and the reaction time of the one projector (8).
4. Device for emulating a spotlight partially covered by a mask, having an input (1) for a lighting control protocol, characterized in that a pattern memory (4) for two-dimensional image patterns and an image mixer (5) connected to the pattern memory (4) and controlled as a function of the channel values of the lighting control protocol are provided, the sum image output (6) of which image mixer (5) is connected to the image input (7) of a digital projector (8) acting as a spotlight.
5. Device according to claim 4, characterized in that the brightness difference between pattern pixels and pattern-free pixels in the sum image output (6) is at least 20%.

6. Device according to claim 4 or 5, characterized in that a plurality of pattern channel inputs are provided for the lighting technology control protocol and in that each pattern channel input is assigned an image plane (13, 14, 15) mixed with the sum image (8) of the image mixer (5).