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(54) **Ambience cinema lighting system**

(57) The present invention relates to a method for providing an ambience light effect in a cinema, the method comprising the steps of receiving a first image from a first image capturing device, the first image being a reproduction of content displayed on a first predetermined portion of the cinema display screen, determining at least one of a color and intensity of the first image, determining a set of control data based on at least one of the color

and intensity of the first image and a positional relation between the first predetermined portion and the individual placement of the plurality of light sources in the cinema, and controlling the plurality of light sources to emit the ambience light effect based on the set of control data.

Advantages with the invention include the possibility to provide an improved ambient lighting experience in cinemas where the video stream from e.g. a projector is not directly accessible.

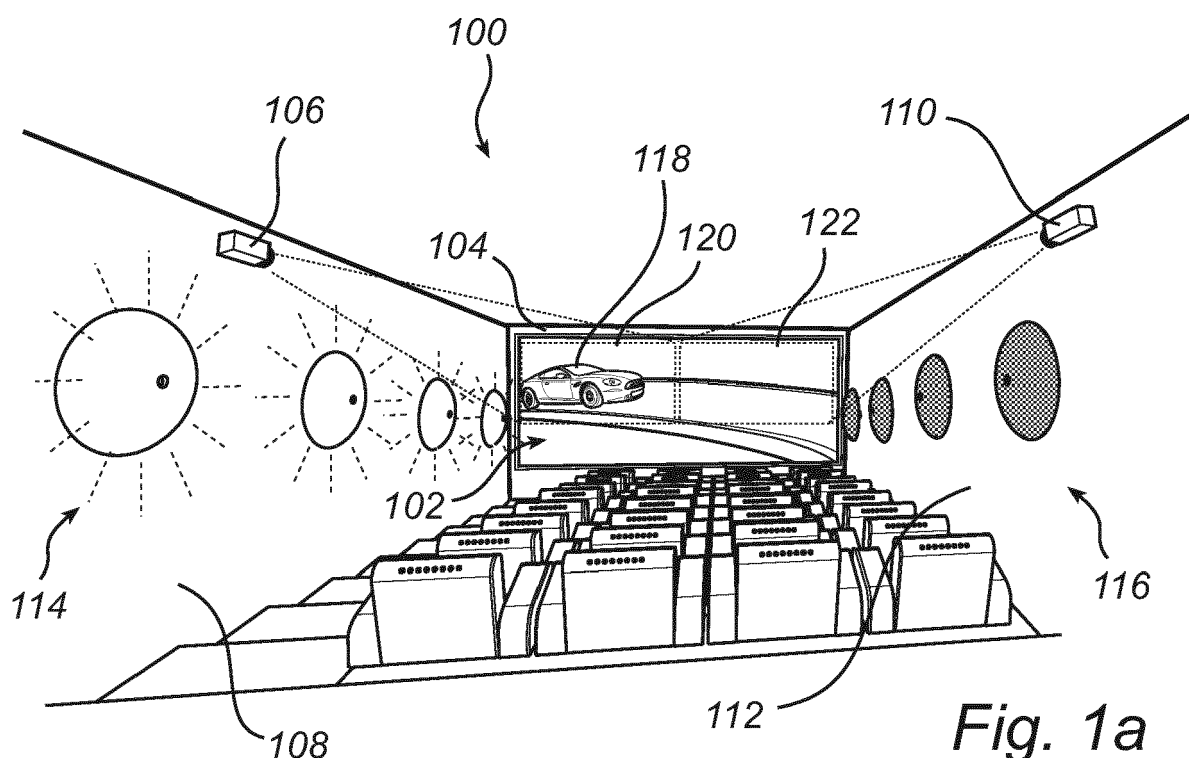


Fig. 1a

Description

FIELD OF THE INVENTION

[0001] The present invention relates to a method for providing an ambience light effect in a cinema. The present invention also relates to a corresponding control unit for providing an ambience light effect in a cinema.

BACKGROUND OF THE INVENTION

[0002] In recent years, so-called ambilight (ambience lighting) TV sets have been very popular amongst TV buyers. Such ambience lighting systems generate light based on the content to be displayed on the TV such that a background light is emitted on the wall behind the TV that matches the content being displayed. The effect is a larger virtual screen and a more immersive viewing experience.

[0003] An example of an extended use of an ambience lighting system is disclosed in WO-2011/073877, presenting a method for providing an ambience light effect in a cinema comprising a cinema display screen and a plurality of light sources. By positioning individual light sources throughout the cinema, and controlling these light sources based on an analysis of subsequent image (s) being shown on the cinema display screen, an ambience light effect is achieved.

[0004] However, even though the method presented in WO-2011/073877 provides an interesting way in which to combine the emission of ambient lighting with the images/video sequences displayed on the cinema display screen there are situations in which the presented method is not applicable, why further developments could be of interest.

SUMMARY OF THE INVENTION

[0005] An object of the present invention is to enable the generation of light from an ambience lighting system at times when no outgoing video signal is retrievable from the means for displaying images/video sequences onto the cinema display screen.

[0006] According to an aspect of the invention, this is at least alleviated by a method for providing an ambience light effect in a cinema, the cinema comprising a cinema display screen and a plurality of light sources, the method comprising the steps of receiving a first image from a first image capturing device, the first image being a reproduction of content displayed on a first predetermined portion of the cinema display screen, determining at least one of a color and intensity of the first image, determining a set of control data based on at least one of the color and intensity of the first image and a positional relation between the first predetermined portion and the individual placement of the plurality of light sources in the cinema, and controlling the plurality of light sources to emit the ambience light effect based on the set of control data.

[0007] The present invention is based on the insight that a first image capturing device may be used for capturing a first image than in turn may be analyzed for the purpose of deriving control data that may be used for controlling light sources arranged at predefined locations in relation to the cinema display screen. Accordingly, there is not necessary to have access to the video stream from e.g. a projector providing the image content provided on the cinema display screen. Thus, it may be possible to introduce the ambience lighting capability into also "older" cinemas where the video content from the projector is not accessible for direct analysis.

[0008] Within the context of the present invention, the expressions "image" and "image capturing device" should be interpreted broadly. That is, an image capturing device could be any light sensing device providing e.g. a single value representing content displayed on the cinema display screen (e.g. single or plurality of photo sensors). Accordingly, the same accounts for the image, plausibly having a resolution as low as a single pixel.

[0009] Preferably, the resolution of the first image is essentially lower than the resolution of the movie content displayed on the cinema display screen. Preferably, the resolution of the first image is less than 10 % of the resolution of the movie content displayed on the cinema display screen. More preferably, the resolution of the first image is less than 5 % of the resolution of the movie content displayed on the cinema display screen. By selecting an image capturing device having a low resolution in relation to the content provided on the cinema display screen, there is provided a minimized risk in infringing possible copyright protection of the content displayed on the cinema display screen when capturing images by means of the image capturing device. As the first image only is a very low resolution representation of the movie content being displayed on the cinema display screen, it will not be seen as an attempt at reproducing the movie content as such. Potential issues relating to existing digital copy rights are thus avoided.

[0010] Preferably, the first predetermined portion corresponds to the upper part of the cinema display screen. Preferably, the first predetermined portion corresponds to at most to the upper 50 % of the cinema display screen. Alternatively, the first predetermined portion may only correspond to the upper 20 % of the cinema display screen, the upper 10 %, or even the upper 5 %. Here, the active selection of direction of the first image capturing device decides the extent of the first predetermined portion from which a first image is received. In addition, the first predetermined portion is related to a selected plurality of light sources adjacent to the first predetermined portion. Depending on the characteristics of the content displayed on the cinema display screen, the predetermined portion may correspond to a variety of different portions of the cinema display screen. In addition, it may also be possible to select different positional relations between the first predetermined portion and the individual placement of the plurality of light sources in the

cinema.

[0011] Also, it may be possible to receive a second image from a second image capturing device. The second image being a reproduction of content displayed on a second predetermined portion of the cinema display screen. Furthermore, the second predetermined portion is preferably different than the first predetermined portion. The plurality of light sources may then be controlled based on sets of control data relating to both the first and second predetermined portions of the cinema display screen. The control data related to the second predetermined portion is determined in the same way as the control data related to the first predetermined portion. Whereas the first and second predetermined portions are essentially different in that they represent different parts of the cinema display screen, they may also be partially overlapping. Alternatively, according to an embodiment of the invention, the first image is segmented into a plurality of sections, the plurality of light source being controlled based on sets of control data relating to the individual sections.

[0012] In a preferred embodiment, the first predetermined portion at least corresponds to the upper left corner of the cinema display screen whereas the second predetermined portion at least corresponds to the upper right corner of the cinema display screen. Also here, the active selection of direction of the first and second image capturing devices may decide the extent of the first and second predetermined portions from which a first and second image is received. In addition, the first and second predetermined portions are related to a selected plurality of light sources adjacent to the first and second predetermined portions, respectively. Depending on the characteristics of the content displayed on the cinema display screen, the predetermined portions may correspond to a variety of different portions of the cinema display screen. In addition, one may also choose different positional relations between the first and second predetermined portions and the individual placement of the plurality of light sources in the cinema.

[0013] According to another aspect of the invention, there is provided a control unit for an ambience lighting system in a cinema, the cinema comprising a cinema display screen and a plurality of light sources, the control unit configured to receive a first image from a first image capturing device, the first image being a reproduction of content displayed on a first predetermined portion of the cinema display screen, determine at least one of a color and intensity of the first image, determine a set of control data based on at least one of the color and intensity of the first image and a positional relation between the first predetermined portion and the individual placement of the plurality of light sources in the cinema, and control the plurality of light sources to emit the ambience light effect based on the set of control data. This aspect of the invention provides similar advantages as the previous aspect of the invention.

[0014] Advantageously, the control unit may further be

configured to receive a second image from a second image capturing device, the second image being a reproduction of content displayed on a second predetermined portion of the cinema display screen, the second predetermined portion being different than the first predetermined portion, wherein the plurality of light sources are controlled based on sets of control data relating to the first and the second image.

[0015] In a preferred embodiment of the invention, the control unit forms part of an ambience lighting system for a cinema, comprising a control unit as defined in any one of claims 6 to 9, an image capturing device configured to be controlled by the control unit, and a plurality of light sources connected to the control unit and configured to emit an ambience light effect in response to control data provided by the control unit. Moreover, the ambience lighting system may also comprise means for displaying image content onto the cinema display screen, e.g. a cinema projector.

[0016] In a further preferred embodiment of the invention, there is provided a cinema, comprising a cinema display screen and the ambience lighting system as described in previous sections.

[0017] Further features of, and advantages with, the present invention will become apparent when studying the appended claims and the following description. The skilled person realize that different features of the present invention may be combined to create embodiments other than those described in the following, without departing from the scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The various aspects of the invention, including its particular features and advantages, will be readily understood from the following detailed description and the accompanying drawings, in which:

Figs. 1a and 1b illustrate a cinema comprising an ambience lighting system according to a currently preferred embodiment of the invention;

Fig. 2 illustrates a conceptual control unit comprised in an ambience lighting system for a cinema, and Fig. 3 is a flow chart of a method for controlling the ambience lighting system.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which currently preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided for thoroughness and completeness, and fully convey the scope of the invention to the skilled addressee. Like reference characters refer to like elements throughout.

[0020] Referring to the drawings, and to Fig. 1a in particular, there is depicted a cinema 100 comprising a cinema display screen 102 arranged on a front wall 104 of the cinema 100, a first image capturing device 106 arranged on a left hand side wall 108 of the cinema, a second image capturing device 110 arranged on a right hand side wall 112 of the cinema, and a plurality of light sources such as wall washers 114 arranged spaced apart on the left hand side wall 108 of the cinema 100 and wall washers 116 arranged spaced apart on the right hand side wall 112 of the cinema 100. In addition, Fig. 1a also depicts an item 118 (in the illustrated example a car) being displayed on a first predetermined portion 120 of the cinema display screen 102. In addition, a second predetermined portion 122 of the cinema display screen 102 is also depicted in Fig. 1a.

[0021] In the illustrated example (with reference also to Fig. 3), content is displayed on the cinema display screen 102 using e.g. a projector for displaying images/video sequences onto the cinema display screen 102. The item 118 is located within the first predetermined portion 120 of the cinema display screen 102. The content displayed on the first predetermined portion 118 of the cinema display screen 102 is reproduced by a first image capturing device 106 which is located on the left hand side wall 108 of the cinema 100. The first image capturing device 106 is configured to be controlled by a control unit. The control unit is, in turn, configured to receive S1 the first image from the first image capturing device 106, the first image being a reproduction of content displayed on a first predetermined portion 120 of the cinema display screen 102. The control unit is further configured to determine S2 at least one of a color and intensity of the first image (this color might be based on a portion of S1). In the embodiment of Fig. 1a, a dominant color of the item 118 will greatly impact the determination of at least one of a color and intensity of the first image. Accordingly, if the color of the item 118 is red (thus, in the illustration a red car), this will influence the subsequent determination S3 of a set of control data based on at least one of the color and intensity of the first image. A positional relation is also established between the first predetermined portion and the individual placement of the plurality of light sources 114 arranged spaced apart on the left hand side wall 108 of the cinema 100. The control unit then controls S4 the plurality of light sources 114 arranged spaced apart on the left hand side wall 108 of the cinema 100 to emit the ambience light effect based on the set of control data. Here, the item 118 influences the emission of light from the plurality of light sources 114. Thus, in the example above, when the item 118 constitutes a red car, the light sources 114 may emit a red light.

[0022] Within the context of the invention, it may be possible to provide a varying number of image capturing devices which reproduce images from a varying number of predetermined portions of the cinema display screen 102. The predetermined portions of the cinema display

screen 102 may be partially overlapping, for example in case certain parts of the image displayed on the cinema display screen require additional representation in the ambience lighting system. The image capturing devices may also have a variety of different individual locations in the cinema 100, as long as they are able to overview their respective predetermined portion of the cinema display screen 102 and are not located as to disturb for example the viewing experience of individual viewers or the displaying of images/video sequences onto the cinema display screen 102. Following the same principal, also the plurality of light sources may be located in a variety of different ways within the cinema 100. In addition to having wall washers 114, 116 on either side of the wall of the cinema 100, one may consider the possibility of arranging a plurality of light sources on the inner ceiling of the cinema 100, or on the backs of individual chairs, all with the ambition of increasing the resulting viewing experience for individual viewers.

[0023] Depending on the input requirements of the control unit and the subsequent desire to control the plurality of lights arranged in the cinema 100, one may consider a situation in which the first determined portion 120 of the cinema display screen 102 corresponds to at least the upper left corner of the cinema display screen 102, while the second determined portion 122 of the cinema display screen 102 corresponds to at least the upper right corner of the cinema display screen 102. As a result, only parts of the image displayed on the cinema display screen is received for determining control data and controlling a plurality of lights. This does not only simplify the determination of control data, but also prevents the infringement of copy rights for the movie being displayed on the cinema display screen.

[0024] Furthermore, the determination of control data can be based on several images, sequentially received from the first and second image capturing device. As a result, the emitted ambient light then represents an average over several sequential images, enabling the smooth transition of the ambient lighting, making it less intensive to look at, thus becoming more comfortable for the eyes of the viewers.

[0025] Turning now to Fig. 1b, an equal situation as that depicted in Fig. 1a is presented. In comparison, in Fig. 1b the item 118 is displayed within the second predetermined portion 122 of the cinema display screen 102. The content of the second predetermined portion 122 of the cinema display screen 102 is reproduced by a second image capturing device 110 which is located on the right hand side wall 112 of the cinema 100. The control data determined from a reproduction of the second image is used to control the plurality of light sources 116 arranged spaced apart on the right hand side wall 112 of the cinema 100 to emit the ambience light effect based on the set of control data. Here, the item 118 influences the emission of light from the plurality of light sources 116. Thus, with reference to the above discussed example of the red car, the plurality of light sources 116 may emit a red light.

[0026] In Fig. 2, there is depicted a conceptual illustration of a control unit 200 comprised in an ambience lighting system for a cinema 202. The illustrated control unit 200 is configured to receive a first image from a first image capturing device 106 and a second image from a second image capturing device 110, as discussed above. With these first and second images, the control unit 200 determines at least one of a color and intensity of each image, and also determines a set of control data based on at least one of the color and intensity of each image and a positional relation between the first and second predetermined portions 120, 122 and the individual placement of the plurality of light sources 114, 116 in the cinema 100. The plurality of light sources 114, 116 are then controlled by the control unit 200 to emit an ambience light effect based on the respective sets of control data.

[0027] With regard to Fig. 2, the first and second images received by the control unit 200 are reproductions of content displayed on the first and second predetermined portions 120, 122 of the cinema display screen 102. As such, the first and second images may represent a variety of different parts of the cinema display screen 102, depending on the input requirements of the control unit and the desire to represent the movie content in the emitting of ambience light. Also, there is a variety of ways in which the plurality of light sources 114, 116 may be coupled to the first and second images received by the control unit 200.

[0028] Even though the invention has been described with reference to specific exemplifying embodiments thereof, many different alterations, modifications and the like will become apparent for those skilled in the art. Variations to the disclosed embodiments can be understood and effected by the skilled addressee in practicing the claimed invention, from a study of the drawings, the disclosure, and the appended claims. Furthermore, in the claims, the word "comprising" does not exclude other elements or steps, and the indefinite article "a" or "an" does not exclude a plurality.

Claims

1. A method for providing an ambience light effect in a cinema, the cinema comprising a cinema display screen and a plurality of light sources, the method comprising the steps of:

- receiving a first image from a first image capturing device, the first image being a reproduction of content displayed on a first predetermined portion of the cinema display screen;
- determining at least one of a color and intensity from the first image;
- determining a set of control data based on at least one of the color and intensity from the first image and a positional relation between the first

predetermined portion and the individual placement of the plurality of light sources in the cinema, and
 - controlling the plurality of light sources to emit the ambience light effect based on the set of control data.

2. The method according to claim 1, wherein the first predetermined portion at least corresponds to the upper part of the cinema display screen.
3. The method according to claim 2, wherein the first predetermined portion corresponds at most to the upper 50 % of the cinema display screen.
4. The method according to claim 1, further comprising the step of receiving a second image from a second image capturing device, the second image being a reproduction of content displayed on a second predetermined portion of the cinema display screen, the second predetermined portion being different than the first predetermined portion, wherein the plurality of light sources are controlled based on sets of control data relating to the first and the second image.
5. The method according to claim 4, wherein the first predetermined portion at least corresponds to the upper left corner of the cinema display screen and the second predetermined portion at least corresponds to the upper right corner of the cinema display screen.
6. The method according to claim 1, wherein the set of control data is determined based in at least two images, sequentially received from the first image capturing device.
7. A control unit for an ambience lighting system in a cinema, the cinema comprising a cinema display screen and a plurality of light sources, the control unit being configured to:

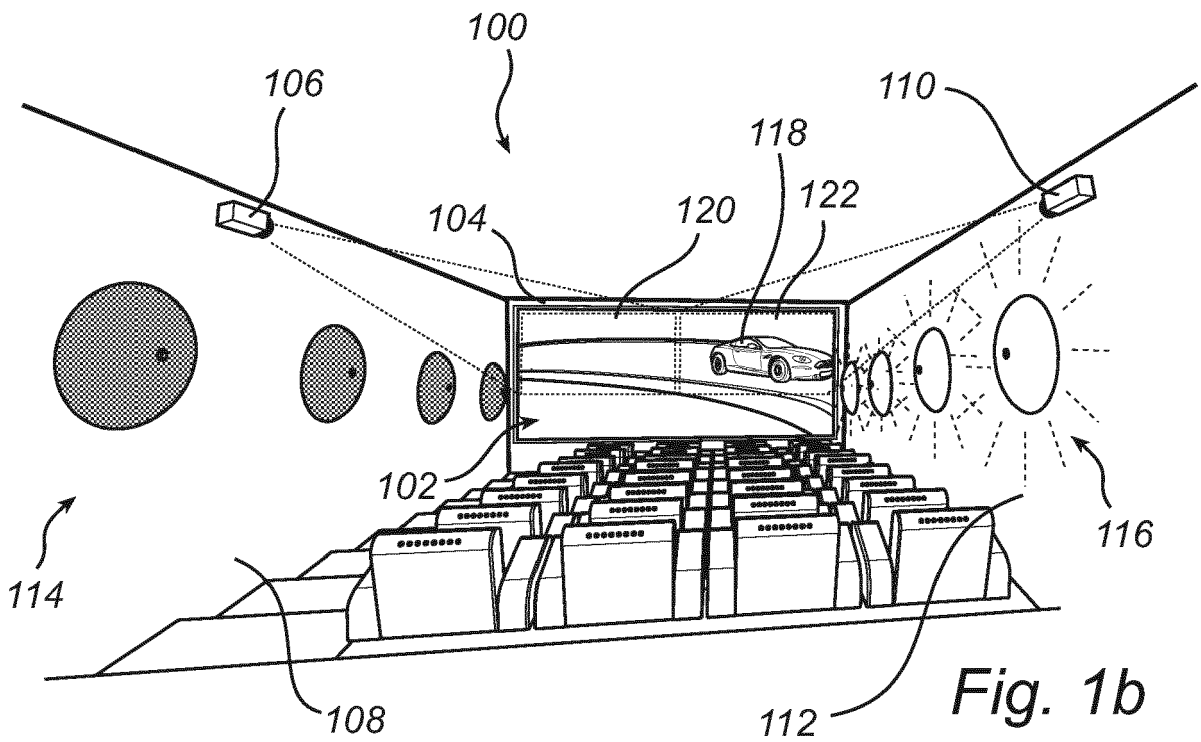
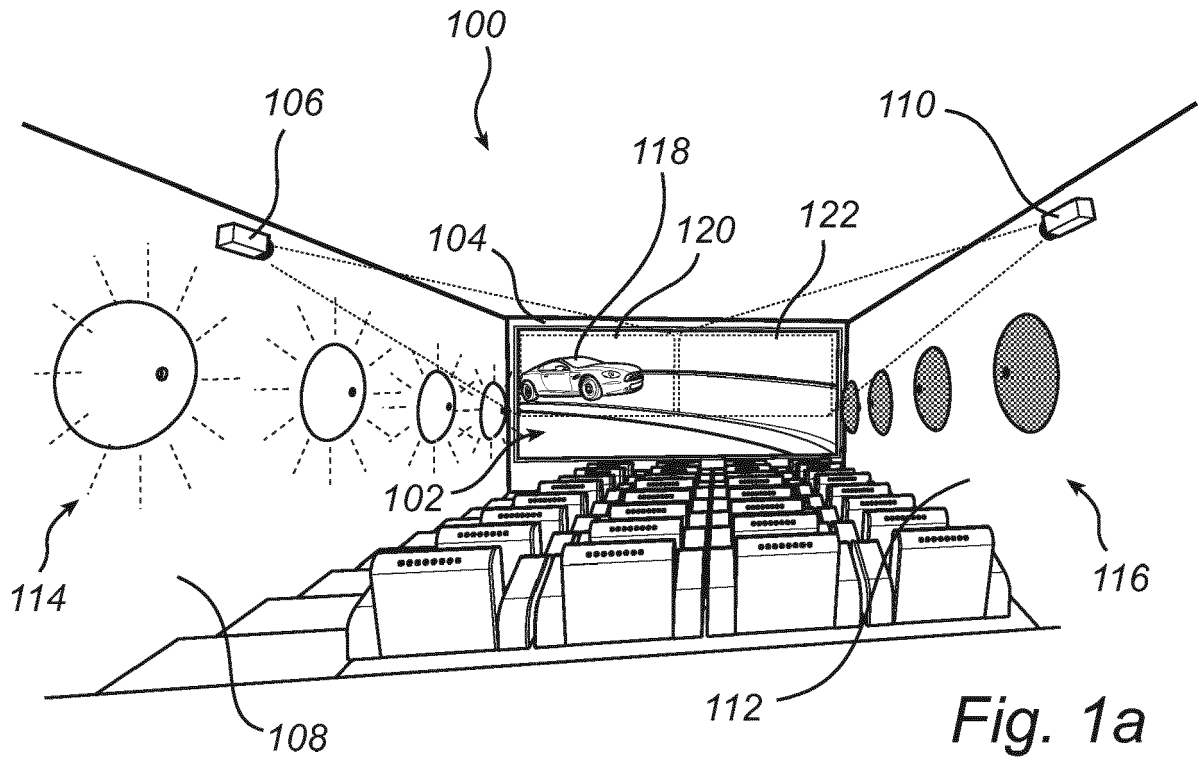
- receive a first image from a first image capturing device, the first image being a reproduction of content displayed on a first predetermined portion of the cinema display screen;
- determine at least one of a color and intensity of the first image;
- determine a set of control data based on at least one of the color and intensity of the first image and a positional relation between the first predetermined portion and the individual placement of the plurality of light sources in the cinema, and
- control the plurality of light sources to emit the ambience light effect based on the set of control data.

8. The control unit according to claim 7, wherein the control unit is further configured to receive a second image from a second image capturing device, the second image being a reproduction of content displayed on a second predetermined portion of the cinema display screen, the second predetermined portion being different than the first predetermined portion, wherein the plurality of light sources are controlled based on sets of control data relating to the first and the second image. 5 10
9. The control unit according to claim 7, wherein the resolution of the first image is essentially lower than the resolution of the movie content displayed on the cinema display screen. 15
10. The control unit according to claim 9, wherein the resolution of the first image is less than 10 % of the resolution of the movie content displayed on the cinema display screen. 20
11. The control unit according to claim 7, wherein the first image capturing device is placed behind the cinema display screen, directed at the cinema display screen and receiving a first image through apertures of the cinema display screen. 25
12. An ambience lighting system for a cinema, comprising: 30
- a control unit as defined in any one of claims 7 to 11;
 - an image capturing device configured to be controlled by the control unit, and
 - a plurality of light sources connected to the control unit and configured to emit an ambience light effect in response to control data provided by the control unit. 35
13. A cinema, comprising a cinema display screen and an ambience lighting system according claim 12. 40

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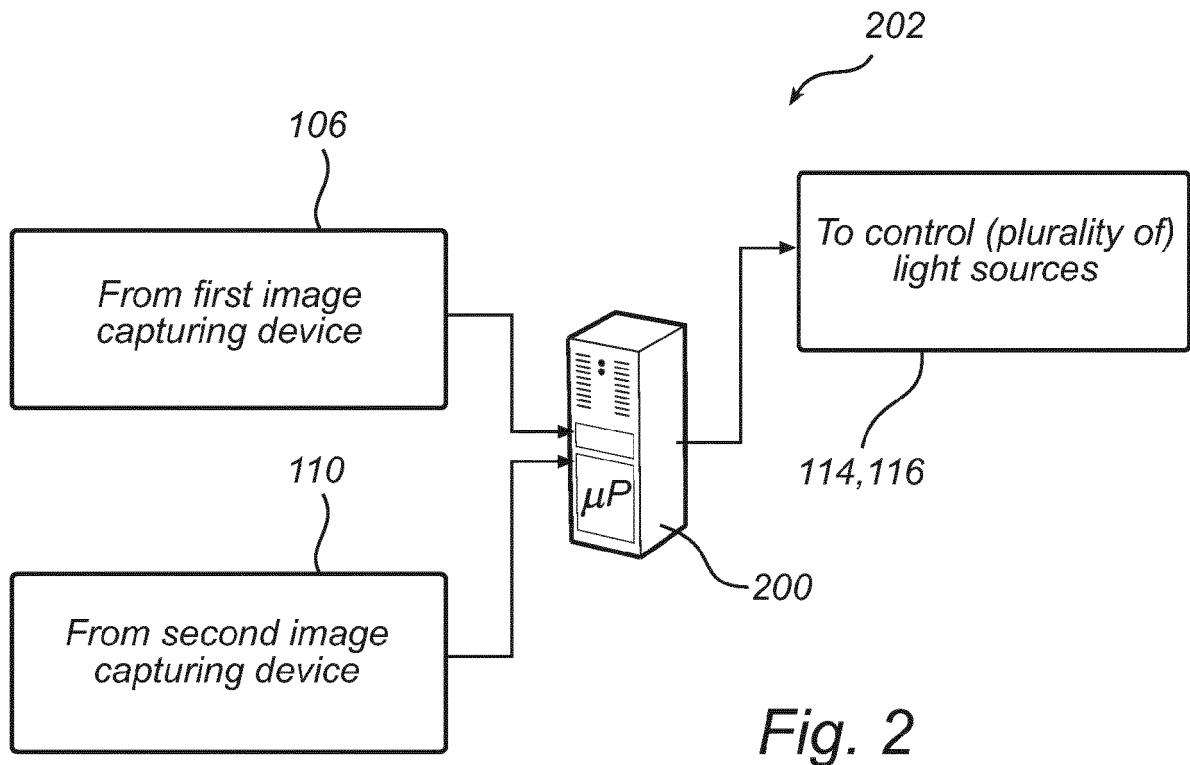


Fig. 2

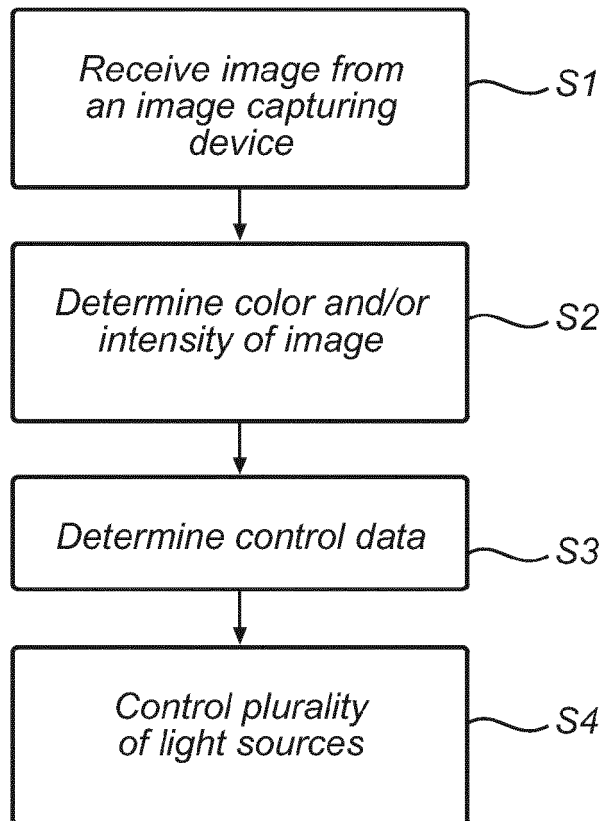


Fig. 3



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 1579

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	WO 2011/073877 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; VAN HERPEN MAARTEN MARINUS JOHANN) 23 June 2011 (2011-06-23) * the whole document *	1-13	INV. H05B37/02
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A	WO 2011/092619 A1 (KONINKL PHILIPS ELECTRONICS NV [NL]; FERI LORENZO [NL]; YIANNI GEORGE) 4 August 2011 (2011-08-04) * the whole document *	1-13	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC) H05B
Place of search Munich		Date of completion of the search 11 July 2012	Examiner Juillot, Olivier J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 12 15 1579

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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11-07-2012

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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