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**Datasheet for the decision
of 3 May 2016**

Case Number: T 1043/11 - 3.5.04

Application Number: 08005827.4

Publication Number: 1986422

IPC: H04N5/235

Language of the proceedings: EN

Title of invention:

Image capturing apparatus, image capturing method, exposure control method, and program

Applicant:

Sony Corporation

Headword:

Relevant legal provisions:

EPC Art. 56

Keyword:

Inventive step - main request (no) - auxiliary request (yes)

Decisions cited:

Catchword:



Beschwerdekammern
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Case Number: T 1043/11 - 3.5.04

D E C I S I O N
of Technical Board of Appeal 3.5.04
of 3 May 2016

Appellant: Sony Corporation
(Applicant) 1-7-1 Konan, Minato-ku
Tokyo (JP)

Representative: Müller Hoffmann & Partner
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Decision under appeal: Decision of the Examining Division of the
European Patent Office posted on 24 January 2011
refusing European patent application
No. 08005827.4 pursuant to Article 97(2) EPC.

Composition of the Board:

Chairman B. Müller
Members: C. Kunzelmann
R. Gerdes

Summary of Facts and Submissions

- I. The appeal is against the decision of the examining division to refuse European patent application No. 08 005 827.4 under Article 97(2) of the European Patent Convention (EPC).
- II. The application was refused on the grounds of added subject-matter (Article 123(2) EPC) in independent claims 1 and 6 of the main request then on file, and lack of inventive step (Article 56 EPC) of the subject-matter of the independent claims of the first, second and third auxiliary requests then on file in view of document
- D1: EP 0 930 780 A1
- and the common general knowledge of the person skilled in the art.
- III. In the first-instance proceedings, reference was also made to document
- D2: EP 0 987 885 A2.
- IV. The applicant appealed against this decision and requested that the decision be set aside. With the statement of grounds of appeal, the appellant filed claims 1 to 10 of main and first auxiliary requests, respectively. The appellant also indicated that claims 1 to 10 of the main request were identical to claims 1 to 10 of the first auxiliary request underlying the decision under appeal.
- V. The board issued a communication pursuant to Article 15(1) of the Rules of Procedure of the Boards

of Appeal (RPBA), annexed to a summons to oral proceedings. In this communication, the board raised objections under Articles 123(2) and 84 EPC against claim 9 of the main and auxiliary requests. Also, the board gave a provisional opinion as to why it considered that the subject-matter of *inter alia* claim 1 of the main and first auxiliary requests did not involve an inventive step.

- VI. By letter of reply dated 31 March 2016, the appellant filed new first, second, third and fourth auxiliary requests. The appellant indicated that the new first auxiliary request addressed the board's objections against claim 9 of the main and the previous auxiliary request. Also, it submitted arguments concerning inventive step of the subject-matter of the second to fourth auxiliary requests.
- VII. Oral proceedings before the board were held on 3 May 2016. During the oral proceedings, the appellant filed claims 1 to 5 and description pages 3a, 5 to 11, 14, 25, 33 and 34 of a fifth auxiliary request. The appellant requested to set aside the decision of the Examining Division dated January 24, 2011, in that a patent be granted on the basis of the claims of the Main Request or, alternatively, one of the First to Fifth Auxiliary Requests. At the end of the oral proceedings, the chairman announced the board's decision.
- VIII. Claim 1 of each of the main and first auxiliary requests reads as follows:

"An image capturing apparatus comprising:
a control unit (10);

an image capturing unit (1, 2) configured to generate a long-exposure image signal and a short-exposure image signal on the basis of light transmitted from a subject and output the long-exposure image signal and the short-exposure image signal as image capturing signals, the long-exposure image signal being generated by exposure for a long exposure period being longer than a short exposure period of the short-exposure image signal;

parameters for the short-exposure image signal being set by the control unit (10), at least one parameter for the long-exposure image signal being configured to be set by a user, the parameters being selected from the group consisting of an exposure period, an aperture value and a gain value;

a signal processing unit (4) configured to generate a combined image signal by combining the long-exposure image signal and the short-exposure image signal, the combined image signal having a dynamic range that is relatively wider than that of at least any one of the long-exposure image signal and the short-exposure image signal; and

a detection unit (6) configured to generate luminance information of the combined image signal, the control unit (10) being configured to detect occurrence of overexposure using the luminance information generated by the detection unit (6) and to perform automatic exposure control for the short-exposure image signal on the basis of a detection result of overexposure to set a new short-exposure period, the next short-exposure image signal being generated by the image capturing unit using the new short-exposure period."

IX. Claim 1 of the second auxiliary request reads as follows:

"An image capturing apparatus comprising:
a control unit (10);
an image capturing unit (1, 2) configured to generate a long-exposure image signal and a short-exposure image signal on the basis of light transmitted from a subject and output the long-exposure image signal and the short-exposure image signal as image capturing signals, the long-exposure image signal being generated by exposure for a long exposure period being longer than a short exposure period of the short-exposure image signal;
parameters for the short-exposure image signal being set by the control unit (10), the parameters being selected from the group consisting of an exposure period, an aperture value and a gain value;
a signal processing unit (4) configured to generate a combined image signal by combining the long-exposure image signal, the long-exposure image signal being based on a user's setting for at least one parameter, and the short-exposure image signal, the combined image signal having a dynamic range that is relatively wider than that of at least any one of the long-exposure image signal and the short-exposure image signal; and
a detection unit (6) configured to generate luminance information of the combined image signal,
the control unit (10) being configured to receive a user's setting operation for at least one parameter for the long-exposure image signal while outputting the generated combined image signal,
the control unit (10) further being configured to detect occurrence of overexposure using the luminance information generated by the detection unit (6) and to perform automatic exposure control for the short-exposure image signal on the basis of a detection result of overexposure to set a new short-exposure

period, the next short-exposure image signal being generated by the image capturing unit using the new short-exposure period."

X. Claim 1 of the third auxiliary request reads as follows:

"An image capturing apparatus comprising:

a control unit (10);

an image capturing unit (1, 2) configured to generate a long-exposure image signal and a short-exposure image signal on the basis of light transmitted from a subject and output the long-exposure image signal and the short-exposure image signal as image capturing signals, the long-exposure image signal being generated by exposure for a long exposure period being longer than a short exposure period of the short-exposure image signal;

parameters for the short-exposure image signal being set by the control unit (10), at least one parameter for the long-exposure image signal being configured to be set by a user, the parameters being selected from the group consisting of an exposure period, an aperture value and a gain value;

a signal processing unit (4) configured to generate a combined image signal by combining the long-exposure image signal and the short-exposure image signal, the combined image signal having a dynamic range that is relatively wider than that of at least any one of the long-exposure image signal and the short-exposure image signal; and

a detection unit (6) configured to generate luminance information of the combined image signal, the detection unit (6) generating a luminance histogram as the luminance information,

the control unit (10) further being configured to receive a user's setting operation for at least one parameter for the long-exposure image signal while outputting the generated combined image signal, the control unit (10) further being configured to detect occurrence of overexposure using the luminance information generated by the detection unit (6) and to perform automatic exposure control for the short-exposure image signal on the basis of a detection result of overexposure to set a new short-exposure period, the control unit (10) being configured to detect occurrence of overexposure in the combined image signal using the luminance histogram, to set a short-exposure period on the basis of a detection result, and to perform the automatic exposure control for the short-exposure image signal using the short-exposure period, the next short-exposure image signal being generated by the image capturing unit using the new short-exposure period."

XI. Claim 1 of the fourth auxiliary request reads as follows:

"An image capturing apparatus comprising:
a control unit (10);
an image capturing unit (1, 2) configured to generate a long-exposure image signal and a short-exposure image signal on the basis of light transmitted from a subject and output the long-exposure image signal and the short-exposure image signal as image capturing signals, the long-exposure image signal being generated by exposure for a long exposure period being longer than a short exposure period of the short-exposure image signal;
parameters for the short-exposure image signal being set by the control unit (10), the parameters being

selected from the group consisting of an exposure period, an aperture value and a gain value;

a signal processing unit (4) configured to generate a combined image signal by combining the long-exposure image signal, the long-exposure image signal being based on a user's setting for at least one parameter, and the short-exposure image signal, the combined image signal having a dynamic range that is relatively wider than that of at least any one of the long-exposure image signal and the short-exposure image signal; and

a detection unit (6) configured to generate luminance information of the combined image signal, the detection unit (6) generating a luminance histogram as the luminance information, the detection unit (6) being configured to classify luminance levels into a black level, an intermediate luminance level, and a white level and to generate information about a distribution of these luminance levels as the luminance histogram;

the control unit (10) being configured to receive a user's setting operation for at least one parameter for the long-exposure image signal while outputting the generated combined image signal,

the control unit (10) further being configured to detect occurrence of overexposure using the luminance information generated by the detection unit (6) and to perform automatic exposure control for the short-exposure image signal on the basis of a detection result of overexposure to set a new short-exposure period, the control unit (10) being configured to detect occurrence of overexposure in the combined image signal using the luminance histogram, to set a short-exposure period on the basis of a detection result, and to perform the automatic exposure control for the short-exposure image signal using the short-exposure period, the control unit (10) being configured to use information about the intermediate luminance level for

setting of the short-exposure period, the next short-exposure image signal being generated by the image capturing unit using the new short-exposure period."

XII. Claim 1 of the fifth auxiliary request reads as follows:

"An image capturing apparatus comprising:

a control unit (10);

an image capturing unit (1, 2) configured to generate a long-exposure image signal and a short-exposure image signal on the basis of light transmitted from a subject and output the long-exposure image signal and the short-exposure image signal as image capturing signals, the long-exposure image signal being generated by exposure for a long exposure period being longer than a short exposure period of the short-exposure image signal;

parameters for the short-exposure image signal being set by the control unit (10), the parameters being selected from the group consisting of an exposure period, an aperture value and a gain value;

a signal processing unit (4) configured to generate a combined image signal by combining the long-exposure image signal, the long-exposure image signal being based on a user's setting for at least one parameter, and the short-exposure image signal, the combined image signal having a dynamic range that is relatively wider than that of at least any one of the long-exposure image signal and the short-exposure image signal; and
a detection unit (6) configured to generate luminance information of the combined image signal, the detection unit (6) generating a luminance histogram as the luminance information, the detection unit (6) being configured to classify luminance levels into a black level, intermediate luminance levels, the intermediate luminance levels comprising intermediate luminance

levels of a higher luminance side and intermediate luminance levels of a lower luminance side, and a white level and to generate information about a distribution of these luminance levels as the luminance histogram; the control unit (10) being configured to receive a user's setting operation for at least one parameter for the long-exposure image signal while outputting the generated combined image signal, the control unit (10) further being configured to detect occurrence of overexposure using the luminance information generated by the detection unit (6) and to perform automatic exposure control for the short-exposure image signal on the basis of a detection result of overexposure to set a new short-exposure period, the control unit (10) being configured to detect occurrence of overexposure in the combined image signal using the luminance histogram, to set a short-exposure period on the basis of a detection result, and to perform the automatic exposure control for the short-exposure image signal using the short-exposure period, the control unit (10) being configured to maintain the short-exposure period when the total of the percentages of the higher luminance side of the intermediate luminance levels exceeds 40% or when the percentage of white level is larger than 5% and lower than 10%, to decrease the short exposure period when the total of percentages of the higher luminance side of the intermediate luminance is equal to or lower than 40% and the percentage of white level is equal to or higher than 10%, and to increase the short exposure period when the total of percentages of the higher luminance side of the intermediate luminance is equal to or lower than 40% and the percentage of white level is equal to or lower than 5%, the next short-exposure image signal being generated by the image capturing unit using the new short-exposure period."

XIII. Claim 2 of the fifth auxiliary request reads as follows:

"The image capturing apparatus according to Claim 1, wherein the control unit (10) sets a new short-exposure period by performing computation using a current short-exposure period and a fixed value."

XIV. Claim 3 of the fifth auxiliary request reads as follows:

"An exposure control method that is performed in an exposure setting mode in which exposure control is performed in accordance with a user's setting and is performed by an image capturing apparatus for obtaining a long-exposure image signal by exposure for a long exposure period being longer than a short exposure period of the short-exposure image signal, at least one parameter for the long-exposure image signal being set by a user, the parameters being selected from the group consisting of an exposure period, an aperture value and a gain value, generating a combined image signal with a dynamic range that is relatively wider than that of at least any one of the long-exposure image signal and the short-exposure image signal by combining the long-exposure image signal and the short-exposure image signal, outputting the generated combined image signal, and receiving a user's setting operation for at least one parameter for the long-exposure image signal while outputting the generated combined image signal, the exposure control method comprising the steps of: obtaining a luminance histogram, as luminance information of the combined image signal, the luminance histogram including information about a distribution of luminance levels classified into a

black level, intermediate luminance levels and a white level, the intermediate luminance levels comprising intermediate luminance levels of a higher luminance side and intermediate luminance levels of a lower luminance side;

detecting occurrence of overexposure in the combined image signal using the luminance histogram; and performing automatic exposure control for the short-exposure image signal using the luminance histogram, wherein a short-exposure period is maintained when the total of the percentages of the higher luminance side of the intermediate luminance levels exceeds 40% or when the percentage of white level is larger than 5% and lower than 10%, the short-exposure period is decreased when the total of percentages of the higher luminance side of the intermediate luminance is equal to or lower than the 40% and the percentage of white level is equal to or higher than 10%, and the short exposure period is increased when the total of percentages of the higher luminance side of the intermediate luminance is equal to or lower than 40% and the percentage of white level is equal to or lower than 5%, and performing automatic exposure control for the short-exposure image signal using the short-exposure period wherein the next short-exposure image signal is generated using the new short-exposure period."

- XV. The reasons for the decision under appeal, as far as relevant to the board's decision, may be summarised as follows:

D1 was considered to represent the closest prior-art document with respect to the subject-matter of claim 1 of the then first auxiliary request. (This claim 1 is identical with claim 1 of the present main and first

auxiliary requests). The image capturing apparatus of claim 1 differed from that known from D1 in that at least one parameter for the long-exposure image signal was configured to be set by a user, the parameters being selected from the group consisting of an exposure period, an aperture value and a gain value. Thus, the problem to be solved by the invention could be regarded as "how to obtain the photographing parameters for the long-exposure image". At the priority date of the application, it was common general knowledge of a person skilled in the art that most electronic cameras normally used an automatic exposure (AE) function, which included controlling the three parameters exposure period, aperture and gain. In such an AE function, none, one or two of these parameters could be manually set by the user. The photographing parameters not manually set were then automatically calculated by the controller in the camera depending on measured light conditions and additional conditions such as motion detection, scene detection or face detection. Thus, the image capturing apparatus of claim 1 did not involve an inventive step.

D1 hinted to an AE function in which the exposure time was preset by the user and the proper light amount was automatically determined by controlling the iris device of the image capturing apparatus.

XVI. The appellant's arguments may be summarised as follows:

It was an object of the invention, as defined in the claims of the main and first auxiliary requests, to provide an image capturing apparatus (and a corresponding exposure control method) having a wide dynamic range in which a quality of the combined image could be improved. In particular, the visibility of

objects which appeared dark could be improved whilst over-exposure was prevented. A typical example was that of a surveillance camera used in a badly lit room. The face of a person in the room could be observed by the operator of the surveillance camera by manually changing the long exposure time, and brightness changes of the windows due to changing sunlight conditions were compensated by the automatic adaptation of the short exposure period (see figure 8 of the application). This object was achieved by the subject-matter of the claims. They specified that at least one parameter for the long-exposure image signal was configured to be set by the user, whereas automatic exposure control (for the short-exposure image) was based on a detection result of over-exposure, which was based on a combined signal of the automatically controlled (short-exposure) image signal and a user-controlled (long-exposure) image signal.

D1 disclosed an image capturing apparatus that operated in an automatic mode in which automatic exposure control was performed. It did not disclose that at least one parameter for the long-exposure signal could be set by a user whilst the parameters for the short-exposure image were set automatically by the apparatus' control unit.

Document D2, which had been considered in the first-instance proceedings, disclosed an image capturing unit in which two automatically controlled image signals were combined or two manually controlled image signals were combined. It did not disclose or suggest the combination of an automatically controlled image signal with a user-controlled image signal. Only the embodiments with automatically controlled image signals should be considered for the assessment of inventive

step. D2 taught manual adaptation to the backlight situation and therefore manual adaptation of the short-exposure image signal.

Moreover, none of the generally known automatic exposure (AE) methods combined a long-exposure image signal, which was based on a user setting with a short-exposure image signal, which was based on an automatic setting, and used this combined signal for performing the automatic exposure control.

Thus, the subject-matter of the claims of the main and first auxiliary requests involved an inventive step.

The claims of the second auxiliary request specified that the user could set the parameter(s) for the long-exposure image signal while the generated combined image was output. This concerned for instance the situation of a large difference between indoor luminance level and outdoor luminance level, when an outdoor portion was saturated and the indoor portion was dark. The user could visually check the result of his parameter setting and thus more precisely set the parameters (so that a clear image of a person in the dark indoor portion could be obtained), whereas over-exposure of the outdoor portion was automatically detected and corrected by the automatic exposure control for the short-exposure image signal.

This was not possible with the image capturing apparatus of D1 or D2, nor was there a hint in any of the available documents to modify the teaching of D1 or D2 accordingly.

The claims of the third auxiliary request additionally specified that the detection unit generated a luminance

histogram as the luminance information and that the control unit detected occurrence of overexposure in the combined image signal using the luminance histogram. None of the cited documents referred to the feature of generating a luminance histogram as the luminance information.

The claims of the fourth auxiliary request additionally specified details of the luminance histogram which were not disclosed or suggested in the cited prior-art documents.

The claims of the fifth auxiliary request related to the overexposure correction of figure 9. In addition to the problem solved by the subject-matter of the claims of the higher-ranking requests, their subject-matter solved the problem of a potential decrease of the luminance level as a consequence of the overexposure correction.

Reasons for the Decision

1. The appeal is admissible.
2. *Main and first auxiliary request:*
Inventive step (Article 56 EPC)
 - 2.1 It is undisputed that document D1 may be considered as the closest prior art to the image capturing apparatus of claim 1, and that this apparatus differs from the one known from D1 in that at least one parameter for the long-exposure image signal is configured to be set by a user, the parameters being selected from the group consisting of an exposure period, an aperture value and

a gain value (see page 2, last paragraph, of the statement of grounds of appeal).

2.2 Indeed, the essential functioning of the image capturing apparatus of D1 (which may be used in a video camera or the like) is based on the same principle as that of the present application, that is the generation of a long-exposure image signal and a short-exposure image signal (S_{long} and S_{short} in D1) and their combination (by a signal mixer 7, see paragraphs [0019] and [0020] of D1). The optimisation of the dynamic range is achieved by modifying the ratio of the exposure times (for S_{long} and S_{short}), in particular by modifying the exposure time for the short-exposure time (see paragraph [0022]). In D1, a mean signal detector 11 and a peak detector 12 are configured to generate brightness information of the combined signal. Global overexposure (mean signal higher than a predetermined value) is detected by means of the mean signal detector 11 and a microcomputer 14. Local overexposure is detected by means of a peak level judge 13 and the microcomputer using the brightness information (see paragraphs [0021] to [0023]). In particular, the microcomputer compares the peak level in an image of the combined signal (S_{mix} in D1) with a predetermined level (such as $1.9 \times$ the saturation level). Moreover, the feedback specified in the last feature of claim 1 is implicit in D1, paragraph 0022.

2.3 In view of the disclosure discussed above, the object of the invention identified by the appellant is achieved by the camera of D1 as well: it has a wide dynamic range in which the quality of the combined image can be improved (see paragraph [0025]). Also, the prevention of over-exposure is disclosed in this paragraph of D1 ("for an object having the maximum

quantity of incident light L4, the image can be reproduced well").

- 2.4 The examining division considered the objective problem solved to be "how to obtain the photographing parameters for the long-exposure image" (see page 6, first paragraph, of the decision).
- 2.5 In view of the above disclosure of D1, the board agrees with the formulation of the objective technical problem as set out in the decision. The appellant has not disputed this formulation of the objective technical problem.
- 2.6 In this context the board notes that it is undisputed that exposure period, aperture value, and gain are the decisive parameters for determining the exposure. Also, it is undisputed that exposure control may be performed on the basis of fully automatically controlled exposure parameters (such as in D1) or on the basis of user input of, for instance, exposure period, with automatic determination of the other parameters (aperture and gain). The second option was considered to belong to the common general knowledge in the decision under appeal and the board agrees.
- 2.7 In the present particular case of high dynamic range (HDR) imaging, the parameters for the short-exposure image and the long-exposure image respectively may, in principle, be set automatically or manually.
- 2.8 Document D2 belongs to the same technical field as D1 (HDR imaging) and the cameras of D1 and D2 operate according to similar principles. D2 discloses in numerous embodiments a large number of potentially

useful options for determining the photographing parameters.

For instance, according to paragraph [0085] the user is able to select a number of settings and paragraph [0088] discloses that shutter speed is one of them (see also figure 7, which indicates manual or automatic setting). However, the "normal image taking mode" referred to in paragraphs [0090] and [0091] is an automatic mode based on AE information in which user input of shutter speed or aperture is not required. Also, the decision as to whether HDR imaging (called SL in D2) is performed or not can be taken automatically or manually (see figures 6A to 6C and the reference to the automatic wide dynamic range image taking mode and the "forced SL image taking mode" in paragraph [0090]). Combinations of these modes are also possible, see paragraph [0100].

2.9 Thus, a person skilled in the art, starting from the teaching of D1 and faced with the problem of obtaining the photographing parameters for the long-exposure image, would have consulted D2. The skilled person would have recognised from D2 that manual or automatic determination of a large number of parameters, including photographing parameters, can be selected at will, and would then have selected the specific parameter constellation underlying claim 1 of the main request in accordance with circumstances.

2.10 It is true that the specific parameter constellation of the exposure amount for the short-exposure image signal being set automatically and that for the long-exposure image signal being set by the user is not disclosed in D2. Also, D2 makes reference to a multiplier for multiplying short-time exposure image data read out

from a memory by an exposure amount ratio A (see paragraph [0093]). Thus, A is a numerical factor for multiplying image data and not an exposure parameter. Hence, D2 does not envisage properly choosing only exposure parameters.

- 2.11 However, in view of the multitude of options discussed in D2, the board finds that this specific parameter constellation is one which the person skilled in the art would have selected in accordance with circumstances, for instance in order to allow the user to arrange for the dark portions of the image being subjectively clearly visible (similar to the scenario disclosed in D2, paragraph [0150]) while, in principle, having the camera of D2 set to an automatic SL taking mode.
- 2.12 The appellant's argument that neither D1 nor D2 hinted to the particular parameter constellation specified in claim 1 did not convince the board that the claimed image capturing apparatus involves an inventive step. Both manual parameter setting and automatic parameter setting are well known, and so are the respective advantages and effects. Hence, the choice between the two is mainly dependent on the desired effects, which in turn may depend on the intended use of the image capturing apparatus. Also, in the description of the present application the foreseeable effects of the particular parameter constellation are essentially used in the well-known context of a surveillance camera: manual setting of the long-exposure period (such as a shutter period) allows the dark portions of a scene to become clearly visible in the combined image, and automatic setting of the short exposure period allows overexposure of the combined image caused by bright portions of the scene to be avoided. Reduction or

avoidance of overexposure and/or underexposure is one of the well-known advantages of HDR imaging.

2.13 The appellant also argued that the image capturing apparatus of D2 essentially functioned either fully automatically or fully manually and thus did not suggest a combination of manually set parameters and automatically set parameters. However, D2 discloses that, for instance, the shutter speed may be set by the user by means of mode setting buttons (see paragraph [0088]) and that the apparatus may determine whether user settings are suitable for taking HDR images (such as in the fourth embodiment illustrated in figures 10A and 10B). Thus, D2 at least hints towards manually setting some parameters and automatically setting others necessary for taking HDR images, essentially in the same manner as discussed in the decision under appeal in the context of a conventional AE function.

2.14 The appellant's arguments concerning the advantages of the invention for an operator of a surveillance camera used in a badly lit room did not convince the board. The image capturing apparatus of claim 1 does not have a technical feature reflecting its use in a surveillance camera and surveillance cameras are well known.

2.15 In view of the above, the board finds that the image capturing apparatus of claim 1 of the main and first auxiliary requests does not involve an inventive step.

3. *Second auxiliary request:
Inventive step (Article 56 EPC)*

3.1 Claim 1 of the second auxiliary request essentially corresponds to claim 1 of the main and first auxiliary

requests with the additional feature that the control unit is configured to receive the user's setting operation **while outputting the generated combined image signal** (emphasis by the board). This reflects the intended use of the image capturing apparatus in a surveillance camera in so far as the output combined image (i.e. the HDR image) may be displayed on a monitor, such that an operator of the surveillance camera may immediately observe the effects of his manual setting parameter changes on the combined image.

- 3.2 It is common general knowledge that users of an image capturing apparatus may wish to see the effects of their setting changes immediately, for instance on a monitor. Also, D2 hints in paragraphs [0094] and [0097] to outputting the combined image, and figures 8 and 10 indicate that the combined image may be displayed together with information about exposure parameters. For instance, the display may indicate that changing the shutter speed may lead to exposure conditions which are suitable for HDR imaging (see, for instance figures 8B and 10B).
- 3.3 Thus, a person skilled in the art would have considered allowing the user of the image capturing apparatus to change the setting parameters while the combined image is being output.
- 3.4 The appellant's argument that D2 only suggested changing parameters affecting the short-exposure image did not convince the board that a person skilled in the art would not have considered allowing the user to also change other exposure parameters.

3.5 In view of the above, the board finds that the image capturing apparatus of claim 1 of the second auxiliary request does not involve an inventive step.

4. *Third auxiliary request:
Inventive step (Article 56 EPC)*

4.1 Claim 1 of the third auxiliary request essentially corresponds to claim 1 of the second auxiliary request with the additional feature of the detection unit generating a luminance histogram as the luminance information, and the control unit being configured to detect occurrence of overexposure in the combined image signal using the luminance histogram, to set a short-exposure period on the basis of the detection result.

4.2 It is common general knowledge that luminance information may be represented by means of a histogram. Moreover, D2 discloses the generation of luminance histograms representing luminance information (see paragraphs [0104] and [0114]).

4.3 Thus, a person skilled in the art would have considered using a luminance histogram representing the luminance information and configuring the control unit such that it can use the luminance histogram for detecting overexposure in the combined image.

4.4 The appellant indicated during the oral proceedings that details of how the histogram was used to control functions of the image capturing unit were reflected in lower-ranking requests.

4.5 In view of the above, the board finds that the image capturing apparatus of claim 1 of the third auxiliary request does not involve an inventive step.

5. *Fourth auxiliary request:*
Inventive step (Article 56 EPC)

5.1 Claim 1 of the fourth auxiliary request essentially corresponds to claim 1 of the third auxiliary request with the additional feature of the histogram having a black level, an intermediate luminance level, and a white level, and the control unit being configured to use information about the intermediate luminance level for setting the short-exposure period.

5.2 The feature that the luminance histogram used for detecting overexposure comprises (at least) three levels *per se* is trivial. It is even questionable whether a histogram with fewer than three levels (i.e. only a black and a white level) would actually be called a histogram.

Furthermore, the feature that (*inter alia*) the intermediate luminance level is used for setting the short-exposure period merely means that the overall brightness of the image (which will be represented by all the luminance levels, including the intermediate luminance level) is taken into consideration when detecting overexposure. This is a usual measure, since overexposure by definition is correlated with excessive brightness of the image.

5.3 In view of the above, the board finds that the image capturing apparatus of claim 1 of the fourth auxiliary request does not involve an inventive step.

6. *Fifth auxiliary request*

6.1 Claim 1 of the fifth auxiliary request is based on original claims 1, 2 and 5 in conjunction with the description on page 20, penultimate line, to page 23, line 6. Details of the luminance histogram are disclosed in figure 5, and on page 23, last paragraph. The overexposure correction process is disclosed in the flow chart of figure 9 and on page 33, line 6 to page 34, line 6. Claim 2 is based, for instance, on original claim 3. Claim 3 specifies an exposure control method (based on original claim 7) corresponding to the normal functioning of the image capturing apparatus of claim 1. Claim 4 specifies an image capturing method (based on original claim 6) including this exposure control method. Claim 5 is based, for instance, on original claim 8.

The description has been brought into conformity with the claims and the relevant prior-art documents have been acknowledged. The board does not see any objections under Articles 123(2) EPC or 84 EPC.

6.2 Claim 1 of the fifth auxiliary request further limits the subject-matter of claim 1 considered in the decision under appeal. That subject-matter was found to be new (see section 2 above). In particular, the image capturing apparatus of claim 1 of the fifth auxiliary request differs from that known from D1 *inter alia* in the overexposure correction, which reflects the flow chart of figure 9. Thus, *a fortiori*, the subject-matter of present claim 1 of the fifth auxiliary request is new (Article 54 EPC).

6.3 As convincingly argued by the appellant during the oral proceedings, the features relating to the overexposure correction solve the problem that an overexposure

correction may undesirably decrease the luminance level in certain portions of the image if the image has a particular type of luminance histogram, as discussed on page 33, line 6 to page 34, line 6. The available state of the art neither discloses this specific problem nor the solution defined in present claim 1. Nor is there any evidence on file that the solution was part of the common general knowledge of the person skilled in the art.

6.4 Thus, the board finds that the image capturing apparatus of claim 1 of the fifth auxiliary request involves an inventive step. The same applies to the subject-matter of the other claims of the fifth auxiliary request.

6.5 The board sees no other objection which would present an obstacle to ordering the grant of a patent with the application documents of the fifth auxiliary request.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.
2. The case is remitted to the department of first instance with the order to grant a patent in the following version:

Description:

Pages 2, 4, 12, 13, 15 - 24, 26 - 32, 35 - 37 as originally filed

Pages 1, 3, 3b as filed with a letter dated 31 July 2009

Pages 3a, 5 - 11, 14, 25, 33, 34 filed during the oral proceedings before the Board

Claims:

1 to 5 according to the Fifth Auxiliary Request filed during the oral proceedings before the Board

Drawings:

Sheets 1/9 to 9/9 with Figures 1 to 10 as originally filed

The Registrar:

The Chairman:



K. Boelicke

B. Müller

Decision electronically authenticated