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(54) Title of the invention: REMOTE RELEASE DEVICE-EQUIPPED CAMERA

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Specification

1. Title of the Invention

Remote Release Device-Equipped Camera

2. Claims

(1) A remote release device-equipped camera, characterized by comprising:

a remote release instruction means for giving an instruction for a remote release operation,

a display means for providing a display to a subject in response to the remote release operation,

a detection means for detecting a change in distance or a speed of the subject during the display operation afforded by the display means and for outputting a detection signal when there was a change in distance or the speed was within a predetermined range, and

an exposure control means for carrying out an exposure operation when the detection means has detected a change in the distance or speed.

3. Detailed Description of the Invention

[Field of Industrial Application]

The present invention relates to a remote release device-equipped camera, and more specifically relates to a camera which has a device enabling remote release operations.

[Prior Art]

So-called self-timer mechanism-equipped cameras, in which exposure is initiated a predetermined amount of time after a photographer presses a release button, have become very common. Furthermore, developments in photography using self-timers have also been seen, to the extent that the camera emits a signal such as light or sound immediately prior to exposure to alert the person or persons who are the subjects.

Moreover, in recent years, proposals have also been made for remote control systems which use a remote control unit to carry out remote operation of release timing. For example, the camera disclosed in JP H1-310332A is a camera having a remote control function, wherein the control operation thereof is such that, as shown in FIG. 13, the photographer presses a transmission button on a transmitter 52 to transmit an optical or electromagnetic, etc., signal to a receiving unit 51 in a camera 50, and the camera detects the transmitted signal and executes a release operation.

[Problem to be Solved by the Invention]

However, the aforementioned conventional remote control device-equipped camera requires both a transmitter and a receiver, making the configuration complex and raising costs. Furthermore, because the transmitter is normally carried while housed inside the camera, the camera body becomes that much larger, among other drawbacks.

An objective of the present invention lies in providing a remote release device-equipped camera which enables remote release operations without using a transmitter or receiver to give a release instruction, thereby achieving a higher degree of freedom, good portability, and cost benefits.

[Means for Solving the Problem and Action]

A remote release device-equipped camera according to the present invention is characterized by comprising: a remote release instruction means for giving an instruction for a remote release operation, a display means for providing a display to a subject in response to the remote release operation, a detection means for detecting a change in distance or a speed of the subject during the display operation afforded by the display means and for outputting a detection signal when there was a change in distance or the speed was within a predetermined range, and an exposure control

means for carrying out an exposure operation when the detection means has detected a change in the distance or speed, the change in distance or speed being provided to the subject during the display operation afforded by the display means, and the exposure operation being carried out on the basis of this change.

[Exemplary Embodiments]

The present invention will be described below with reference to exemplary embodiments in the drawings.

FIG. 1 is a block configuration view of principal parts of a remote release device-equipped camera showing a first exemplary embodiment of the present invention, the principal parts of the present camera being configured by a CPU 1 which controls the overall system, a distance measuring device 2, which is the detection means for detecting a change in distance of the subject and for outputting a detection signal on the basis of this change, a display device 4 which is the display means for providing a display to the subject, using a high-brightness LED as a display unit, an exposure device 5, which is the exposure control means, and a mode switch 3 which is the remote release instruction means for selecting the remote release mode. First, an overview of operation of remote release by the camera according to the present exemplary embodiment will be described with reference to the time chart in FIG. 2 and the view showing distance measurement in FIG. 3.

For the release in the remote release processing mode of the present camera, a predetermined motion by the subject 10, who is the photographer, in conjunction with the display timing of the display device 4 is detected, and exposure is carried out on the basis of a detection signal thereof. Display by the display device has three display formats, namely display patterns I, II, and III. These displays are always visible from the subject side. The patterns I and II form a pair in which the display pattern I is multiple flashes of a display LED 4a as indicated by the display output of the display device in FIG. 2, and the display pattern II is continuous illumination of the LED 4a for a relatively short amount of time. The patterns I and II are repeated at predetermined intervals T_0 as shown in FIG. 2.

Furthermore, the pattern III is a pattern displayed to warn of shutter release immediately prior to the exposure operation, and is a repeated flashing for a predetermined amount of time.

With the remote release of the camera according to the present exemplary embodiment, the photographer gives a release instruction by means of a predetermined motion towards the camera in conjunction with the display timing of the aforementioned display patterns, the distance measurement device 4 detects this motion by the subject 10, and exposure is carried out. Specifically, as shown in FIG.

3(A) (B), the photographer, who is the subject 10 located within the distance measurement range, performs a motion such as moving his or her hand forward, for example, synchronously with the display of the pattern I by the display LED 4a of the camera 11 when he or she wishes to release the shutter. The distance measurement device 2 detects the location of this motion, and the distance measurement value thereof is imported as ℓ_1. Furthermore, if the photographer moves his or her hand down to set the photography state when the pattern II is displayed, the distance measurement value of that motion is imported as ℓ_2. The distance measurements in these cases may be made immediately after the pattern displays are output and/or during output.

If there is a difference between the distance measurement values ℓ_1 and ℓ_2, the same confirmation operation is repeated thereafter. This repetition serves to distinguish with greater certainty between cases where the subject 10 accidentally moved and cases where the subject 10 made a motion in order to give the release instruction. If the distance measurement in conjunction with each of the patterns is repeated twice, and a change in the difference in distance of the distance measurement values ℓ_1 and ℓ_2 is within a predetermined range in the two distance measurement results, the camera determines that the photographer has given a release instruction. The pattern III is then displayed and exposure is carried out.

Next, a remote release process by the camera according to the present exemplary embodiment will be described with reference to the flowchart in FIG. 4.

First, when the mode switch 3 is turned on to instruct the remote release mode, the remote release process starts and a distance measurement repeat count m is reset to 0 (step S101). Next, the display pattern I is output by the display LED 4a of the display device 4 (step S102). The distance measurement value ℓ_1 of the distance to the subject is then imported by the distance measurement device 2 (step S103). The display pattern II is also output and the distance measurement value ℓ_2 is measured (steps S104 and S105). In steps S102 to S105 above, the photographer, who is the subject 10, moves his or her hand forward in response to display of the pattern I as described above when he or she intends for the shutter to be released, and lowers his or her hand in response to the display of the pattern II. If there is no intent for the shutter to be released, this motion is not made.

Next, the count m is incremented (step S106) and the difference between the distance measurement values ℓ_1 and ℓ_2 is read as a distance difference $\Delta\ell(m)$ (step S107). In cases where the hand is moved forward, this distance difference $\Delta\ell(m)$ is a value substantially equal to the length of an arm. The process only returns to step S102 if the count m is 1, i.e. during the first distance measurement, or if the value $\Delta\ell(m)$ is 0, i.e., there has been no change, and the process proceeds to step S110 in

all other cases. Here, the value of the difference between the final distance difference $\Delta\ell(m)$ and the preceding distance difference $\Delta\ell(m-1)$ is imported as a fluctuation value $\Delta\varepsilon$. If this fluctuation value $\Delta\varepsilon$ is within a predetermined range, i.e. between values ℓ_N and ℓ_F, then the photographer has carried out a predetermined motion for instructing release twice in a row, and therefore the CPU 1 proceeds to step S113 on the assumption that an instruction to carry out release has been made. After display of the pattern III has been output, the exposure process is carried out (step S114), and the remote release operation is terminated. On the other hand, if in step S111 the fluctuation value $\Delta\varepsilon$ is not within the predetermined range, then the operation instructing release has still not been detected twice in a row, and it is determined that the photographer does not yet intend to execute release. The process returns to step S102, and distance measurement is repeated in a range such that the count m does not exceed 50 times. If 50 times is exceeded without the aforementioned conditions being satisfied, it is determined that either a problem has occurred with distance measurement or there is no intent to instruct release, and the process is terminated.

As described above, with the camera according to the present exemplary embodiment, there is no particular need for the receiver 51 and the transmitter 52 for remote operation, which would be needed in conventional examples, making it possible to carry out remote release using a shutter timing based on the intent of the photographer. Moreover, since release is performed only when the motion for instructing release has been made twice in a row, there is no uncertainty about the remote release operation. Furthermore, the camera is easy to use because the number of repetitions is limited to a predetermined value, 50 times in the present exemplary embodiment, meaning that the process exits remote release mode automatically if no instruction is given for a long period of time. Note that it is also possible to cancel the remote release mode each time remote release is completed once.

As a variant example of the aforementioned exemplary embodiment, a camera capable of remote zoom instructions can be proposed. In a camera 11', output of a display pattern by a display device is repeated three times. For example, as shown in FIG. 5(A), (B), (C), when zooming towards the telephoto side, the photographer, who is the subject 10, first moves his or her hand forward in time with the display of the pattern, and this distance measurement value is ℓ_1 (FIG. 5(A)). Next, the hand is lowered during display of the following two patterns, and that distance measurement value is ℓ_2 (FIG. 5(B), (C)). Meanwhile, as shown in FIG. 6(A), (B), (C), when zooming towards the wide angle side, the hand is extended during display of the first two patterns, and the distance measurement value is ℓ_1 (FIG. 6(A), (B)). The hand is lowered during display of the last pattern, and that distance measurement value is ℓ_2 (FIG. 6(C)). Thus, the intent to set the zoom, i.e.,

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