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Title of Invention

Digital photographing device and its control method

Title of Invention

Digital photographing apparatus and controlling method thereof

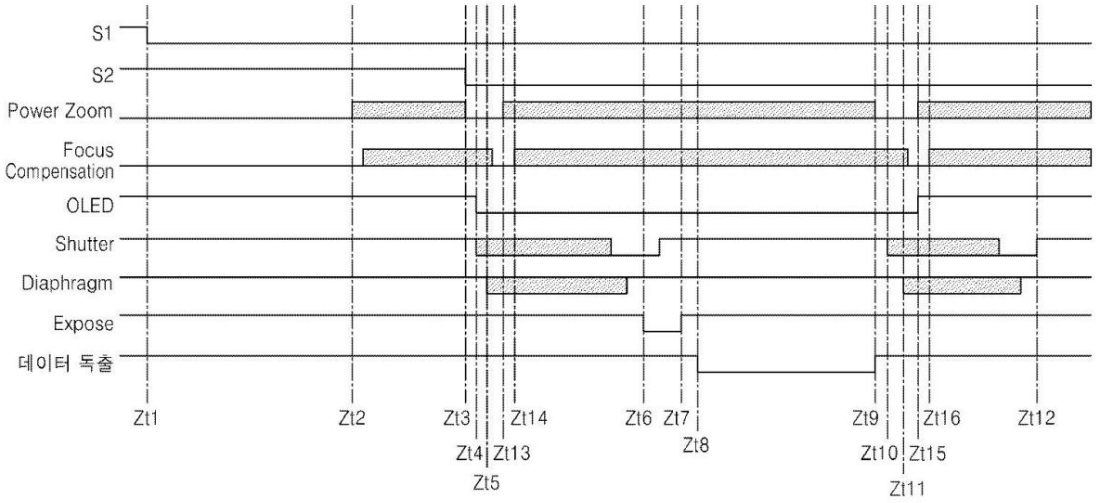
summary

Embodiments of the present invention relate to a digital photographing device and a control method thereof. digital photographing device including a main body and an of the power zoom p, wherein the interchangeable lens performs a power zoom operation. A performing unit, in which the interchangeable lens performs a power zooming unit that performs ms the power zooming embodiments are the digital pho tographing device including the through the imaging lens , The main body part has an interchangeable main body part and an aperture that adjusts the amount of light passing capturing light, an image pickup device that generates an arc, and lens mounted on the main body part as to generate an image signal by photography device and method for control, operation of the shutter a shutter that controls exposure of the image pickup device, the digital and the light passing the taking lens or t, and when the release and aperture It includes a release control unit that controls ling the same the driving, of config zoom operation. Characterized in that configured control starts driving the shutter or aperture, the power zooming when it starts photo graphing device is provided of the iris in the invention a to to prohibit, digitally cured to forbidding the power zooming. The digital re stably control the power zoom operation by providing a photographing device. controlled.

Abstract

The release control unit is the shutter the iris, and is a interchangeable lens mounted on the main body, controlling the amount is included

Representative drawing



scope of claim

Claim **1:**

A digital photographing apparatus including a main body and an interchangeable lens mounted on the main body,

The interchangeable lens,

a power zoom performer performing a power zoom operation; and

An aperture that controls the amount of light passing through the imaging lens; includes,

The body part,

an imaging device that captures the light and generates an image signal;

a shutter controlling exposure of the imaging device; and

the operation of the shutter and the diaphragm of the image pickup device in which

The digital photographing apparatus of claim 1 , wherein the release control unit is configured to prohibit the power zoom operation when driving of the shutter or the iris is started.

Claim **2:**

According to claim 1,

The release control unit,

and prohibiting the driving of the power zoom operation for a preset time after driving of the shutter or the iris is started.

Claim **3:**

According to claim 1,

The interchangeable lens changes the focal length according to the power zoom operation.

Scope of Claims

Claim 1:

The digital photographing device it is the digital photographing device including the main body part and the interchangeable lens mounted on the main body pa rt ; it includes the power zoom performing unit :

in which

interchangeable lens performs

power zooming and the iris controlling amount of the lig ht passing the taking lens ; it includes the release cont rol unit controlling the shutter :

of controlling the exposure of the image pickup devic e :

A release control unit for controlling

main body part takes a picture of

light and producing the image signal the shutter and op eration of the iris ;

release control unit discloses the driving of the shutter or the iris ; and for configured to forbidding the power zooming.

Claim 2:

As for claim 1, the digital photographing device in which

release control unit is configured to forbid the driving o f the power zooming after the driving initiation of

shutter or the iris for the pre-set time.

Claim 3:

As for claim 1, the digital photographing device wherein

Further comprising a correction unit for performing varifocal correction to correct,

The correction unit,

and performing the variable focus correction even when the driving of the power zoom operation is prohibited by the release control unit.

interchangeable lens further includes the correction uni t achieving the variable focus (varifocal) correction tha t amends the focus distance change according to the power zooming, and

correction unit is configured to achieve the variable foc us compensation even in case the driving of the power zooming is inhibited with

release control unit.

Claim **4:**

According to claim 1,

The interchangeable lens,

a lens storage unit that stores power consumption information; and

Further comprising a; communication unit for transmitting the power consumption information to the body unit,

The release control unit,

The digital photographing information of power consumption is the reference value device, characterized in that configured to prohibit driving to or greater than a reference value. e or greater; and is configured to forbid the driving of the power zooming.

Claim 4:

As for claim 1, the digital photographing device wherein

interchangeable lens further includes the communicatio n unit transmitting the lens storage :

and information of power consumption with the main bo dy part that stores

information of power consumption, and

release control unit

of the power zoom operation when the power consumption information is equal

Claim **5:**

According to claim 1,

The interchangeable lens,

a lens storage unit that stores power consumption information; and

Further comprising a; communication unit for transmitting the power consumption information to the body unit,

The release control unit,

When the power consumption information is less than a reference value, the digital information of power consumption is less than the refer hair power zoom operation. ence value ; and is configured to not forbid the driving of the power zooming.

Claim 5:

As for claim 1, the digital photographing device wherein

interchangeable lens further includes the communicatio n unit transmitting the lens storage :

and information of power consumption with the main bo dy part that stores

information of power consumption, and

release control unit

photographing device, characterized in that configured not to prohibit driving of the

Claim **6:**

According to claim 1,

The power zoom performer,

Wherein the digital photographing apparatus is configured to stop the power zoom operation when an operation of the shutter or the iris is started by the release controller while the power zoom operation is performed by the power zoom performer. .

Claim 6:

As for claim 1, the case where the operation of the shutter or the iris is disclosed with the release control unit

power zoom performing unit the power zooming is perfo rmed by

power zoom performing unit, and the digital photograph ing device for configured to stopping the power zoomin g.

Claim **7:**

According to claim 6,

Claim 7:

As for claim 6, the digital photographing device wherein

The interchangeable lens further includes a correction unit performing varifocal correction for correcting a change in focal length according to the power zoom operation,

The correction unit,

When the driving of the power zoom operation is prohibited by the release control unit, the operation is stopped after performing the variable focus correction until the point at which the power zoom operation is stopped.

interchangeable lens is configured to stop the operatio n the variable focus compensation to the point of time when the case, and the power zooming are stopped is achieved that the driving of the power zooming is inhibi ted by

correction unit, is

release control unit the correction unit achieving the v ariable focus (varifocal) correction further is included a mending the focus distance change according to the p ower zooming.

Claim **8:**

According to claim 1,

Driving the shutter,

and at least one of shutter closing driving for closing the shutter and shutter opening driving for opening the shutter.

Claim 8:

As for claim 1, the digital photographing device comprising at least any one among the shutter open dri ving wherein the driving of

shutter opens the shutter block drive and shutter that close

shutter.

Claim **9:**

A control method of a digital photographing device that performs a power zoom operation by user's manipulation, comprising:

A control method of a digital photographing apparatus characterized in that, when driving of a shutter or aperture is started, the power zoom operation is prohibited.

Claim 9:

The control method of the digital photographing device it is the control method of the digital photographing de vice for performing the power zooming with the operati on from the user ; it starts the driving of

shutter or the iris ; and for forbidding the power zoomin g.

Claim 10:

According to claim 9,

The control method of the digital photographing apparatus, characterized in that for a predetermined time after the start of driving the shutter or aperture, the driving of the power zoom operation is prohibited.

Claim 10:

As for claim 9, the control method forbidding the driving of the power zooming after the driving initiation of

shutter or the iris for the pre-set time of the digital ph otographing device.

Claim 11:

According to claim 9,

The digital photographing device performs varifocal correction for correcting a change in focal length according to the power zoom operation,

The control method of the digital photographing apparatus, characterized in that performing the variable focus correction even when the driving of the power zoom operation is prohibited.

Claim 11:

As for claim 9, the control method of the digital photographing device wherein

digital photographing device performs the variable focu s compensation the driving of

power zooming is inhibited the variable focus (varifocal) correction is achieved that amends the focus distance change according to the power zooming.

Claim 12:

According to claim 9,

The digital photographing device includes an interchangeable lens and a main body in which the interchangeable lens is mounted,

The interchangeable lens transmits power consumption information to the main body

Claim 12:

The control method of the digital photographing device of claim 9, wherein

digital photographing device comprises the interchange able lens and the main body part in which the intercha ngeable lens is mounted, and

go,

The method of claim 1 , wherein the main body prohibits driving of the power zoom operation when the power consumption information is greater than or equal to a reference value.

interchangeable lens forbids the driving of the power zo oming the information of power consumption

main body part is the reference value or greater the inf ormation of power consumption is transmitted with the main body part.

Claim 13:

According to claim 9,

The digital photographing device includes an interchangeable lens and a main body in which the interchangeable lens is mounted,

The interchangeable lens transmits power consumption information to the main body,

information is less than a reference value.

Claim 13:

The control method of the digital photographing device of claim 9, wherein

digital photographing device comprises the interchange able lens and the main body part in which the intercha ngeable lens is mounted, and

The method of claim 1 , wherein the main body unit does not prohibit driving of the power zoom operation when the power consumption

main body part is less than the reference value the info rmation of power consumption is transmitted with the main body part.

Claim 14:

According to claim 9,

When the operation of the shutter or iris is started while the power zoom operation is performed by the power zoom performer, the is stopped. The device's opping the power zooming of the digital

Claim 14:

As for claim 9, the case where the operation of the shutter or the iris is disclosed the power zooming is per formed by

operation of the power zoom power zoom performing unit, and the control method st photographing method. device.

Claim 15:

According to claim 14 ,

The digital photographing device performs varifocal correction for correcting a change in focal length according to the power zoom operation,

and stopping the operation after performing the variable focus correction up to the point at which the power zoom operation is stopped when the driving of the power zoom operation is prohibited.

Claim 15:

As for claim 14, the control method which stops the operation after it achieves the variable focus compens ation to the point of time when the case, and the pow er zooming are stopped of the digital photographing de vice wherein

digital photographing device performs ; and the driving of

power zooming is inhibited the variable focus (varifocal) correction that amends the focus distance change acc ording to the power zooming.

Claim 16:

According to claim 9,

Driving the shutter,

The control method of a digital photographing apparatus comprising at least one of a shutter blocking drive for closing the shutter and a shutter open drive for opening the shutter.

Claim 16:

As for claim 9, the control method which comprises at least any one among the shutter open driving of the di gital photographing device wherein the driving of

shutter opens the shutter block drive and shutter that close

shutter.

technology field

Technical Field

The present invention relates to a digital photographing device and a control method thereof. The present invention relates to the digital photographing device and method for controlling the sa

me.

background art

Background Art

Digital photographing devices such as cameras and camcorders can perform a zoom operation to enlarge a distant subject and adjust the focus to capture a clear still image or moving picture. In addition, in performing other various functions, the digital photographing device drives a zoom lens, a focus lens, an aperture, a shutter, and the like, and requires predetermined power to drive each component.

So that digital photographing device including the camera, the camcorder etc.s enlarge the subject which is in the distant distance, the zooming can be performe d and in order to take a picture of the static images or the clear moving picture, the focus can be controlled.

Moreover, the digital photographing device functions w hich the other are various are performed requires the p redetermined electricity to drive each part the zoom le ns, the focus lens, the iris, the shutter etc is operated.

content of invention

Summary of Invention

problem to be solved

Problem to be solved

A technical problem to be solved by embodiments of the present invention is to provide a digital photographing device capable of stably controlling a power zoom operation and a control method thereof.

The digital photographing device and the method for controlling the same in which the technical problem which the embodiments of the invention solves can control the stable power zooming are to be provided.

means of solving problems

Means to solve the problem

In order to solve the above technical problem, one aspect of the embodiment according to the present invention To solve the technical problem, one side of the body and an interchangeable lens mounted on the body, according to the embodiment according to the present invention is the digital As a photographing device, an interchangeable lens includes a digital photographing device including the main body power zoom performing unit capable of performing a power zoom operation, adjusting the amount of light passing through the imaging lens part and the interchangeable lens mounted on the main amount of the light, and the main body includes an imaging device that body part and the It includes an aperture that controls the iris controlling unit, in which the shutter controls exposure of the imaging device, and an captures light and generates an image signal passing the power zoom performing control unit that controls the operation of the shutter and iris. device, in interchangeable The lens performs the power zooming and includes a release configured to inhibit a zoom operation. and producing the image signal which the main body part takes a picture of the light, characterized in that it is iris is included and when the release control unit discloses the driving of the and the shutter, controlling the exposure of the image pickup device and shutter and shutter or the digital photographing device for configured to iris

forbidding the power zooming is provided.

According to another feature of the present invention, the release control unit may prohibit driving of the power zoom operation for a preset time after starting to drive the shutter or aperture.

According to other characteristics of the present invention, the release control unit can forbid the driving of the power zooming after the driving initiation of the shutter or the iris for the pre-set time.

According to another feature of the present invention, the interchangeable lens further includes a correction unit that performs varifocal correction for correcting a change in focal length according to the power zoom operation, and the correction unit drives the power zoom operation by the release control unit. Variable focus correction can be performed even when this is prohibited.

According to another characteristic of the present invention., the correction unit achieving the variable focus (varifocal) correction in which the interchangeable lens amends the focus distance change according to the power zooming further is included and the correction unit can perform the variable focus compensation even in case the driving of the power zooming is inhibited with the release control unit.

According to another feature of the present invention, the interchangeable lens further includes a lens storage unit for storing power consumption information and a communication unit for transmitting the power consumption information to the body unit, and the release control unit is configured to: Driving of the power zoom operation can be prohibited.

According to another characteristic of the present invention., the lens storage, and the communication unit transmitting the information of power consumption with the main body part further are included and in case the information of power consumption the release control unit is the reference value or greater the

driving of the power zooming can be forbidden. As to the lens storage, the interchangeable lens stores the information of power consumption.

According to another feature of the present invention, the interchangeable lens further includes a lens storage unit for storing power consumption information and a communication unit for transmitting the power consumption information to the main body unit, and the release control unit comprises: when the power consumption information is less than a reference value, Driving of the power zoom operation may not be prohibited.

According to another characteristic of the present invention., the lens storage, and the communication unit transmitting the information of power consumption with the main body part further are included and in case the information of power consumption the release control unit is less than the reference value the driving of the power zooming is not forbidden. As to the lens storage, the interchangeable lens stores the information of power consumption.

According to another feature of the present invention, the power zoom performer, the performer, the release control unit the power zoom When the operation of the power zoom where the operation of the shutter or the iris is can be stopped.

power zoom According to another characteristic of the present invention., while the power zooming is performed by, while the power zoom operation is performed by shutter or the iris is started by the performing unit it can stop the case, the operation of the disclosed with the release control unit, and the power zooming.

According to another feature of the present invention, the interchangeable lens further includes a correction unit that performs varifocal correction for correcting a change in focal length according to the power zoom operation, and the correction unit drives the power zoom operation by the release control unit. If this is prohibited, the operation can be stopped after performing variable focus correction up to the point at which the power zoom operation is stopped.

According to another characteristic of the present invention., the correction unit achieving the variable focus (varifocal) correction in which the interchangeable lens amends the focus distance change according to the power zooming further is included and the operation can be stopped after the correction unit performs the case where the driving of the power zooming is inhibited with the release control unit, and the variable focus compensation to the point of time when the power zooming is stopped.

According to another feature of the present invention, the driving of the shutter may include at least one of shutter closing driving for closing the shutter and shutter opening driving for opening the shutter.

According to another characteristic of the present invention., the driving of the shutter comprises the shutter block drive putting the shutter on and at least any one among the shutter open driving opening the shutter.

In order to solve the above technical problem, another aspect of an embodiment according to the present invention is a control method of a digital photographing device that performs a power zoom operation by a user's manipulation. Provided is a control method of a digital photographing device characterized in that the operation is prohibited.

To solve the technical problem, it is the control method of the digital photographing device in which the dissimilar side of the embodiment according to the present invention performs the power zooming with the operation from the user and when the driving of the shutter or the iris is started the control method of the digital photographing device for forbidding the power zooming is provided.

According to another feature of the present invention, driving of the power zoom operation may be prohibited for a preset time after the start of driving the shutter or aperture.

According to other characteristics of the present invention, the driving of the power zooming can be forbidden after the driving initiation of the shutter or the iris for the pre-set time.

According to another feature of the present invention, the digital photographing device amends the correction, and even when the driving of the power zoom operation is defocus correction. is achieved and the variable focus compensation can be achieved

provides power zoom According to another characteristic of the present invention., the variable focus (varifocal) correction in which the digital The photographing device prohibited, the focus distance change according to the power zooming may perform the even in case the driving of the power zooming is inhibited.

According to another feature of the present invention, the digital photographing device is interchangeable lens are mounted, and the interchangeable lens the interchangeable lens and the main unit prohibits the driving of the power zoom operation when the power consumption value.

According to another characteristic of the present invention., the digital photographing device includes a body part in which a lens and an interchangeable body part in transmits power consumption information to the body part, The body which the interchangeable lens is mounted and the information exceeds the standard

can

interchangeable lens transmits the information of power consumption with the main body part and in case the information of power consumption as to the main body part, is the reference value or greater the driving of the power zooming can be forbidden.

According to another feature of the present invention, the digital photographing device includes an interchangeable lens and a main body in which the interchangeable lens is mounted, the interchangeable lens transmits power consumption information to the main body, and the main body transmits power consumption information when the power consumption information is less than a reference value, Driving of the power zoom operation may not be prohibited.

According to another characteristic of the present invention., the digital photographing device includes the interchangeable lens and the main body part in which the interchangeable lens is mounted and the interchangeable lens transmits the information of power consumption with the main body part and in case the information of power consumption as to the main body part, is less than the reference value the driving of the power zooming is not forbidden.

According to another feature of the present invention, when an operation of a shutter or an iris is started while a power zoom operation is performed by a power zoom performer, the power zoom operation may be stopped.

According to another characteristic of the present invention., while the power zooming is performed by the power zoom performing unit the case where the operation of the shutter or the iris is disclosed, and the power zooming can be stopped.

According to another feature of the present invention, the digital photographing device performs varifocal correction for correcting a change in focal length according to a power zoom operation, and when driving of the power zoom operation is prohibited, the power zoom operation is stopped. After performing variable focus correction up to the viewpoint, the operation can be stopped.

According to another characteristic of the present invention., the variable focus (varifocal) correction in which the digital photographing device amends the focus distance change according to the power zooming is achieved and the operation can be stopped after the case where the driving of the power zooming is inhibited, and the variable focus compensation to the point of time when the power zooming is stopped are achieved.

According to another feature of the present invention, the driving of the shutter may include at least one of shutter closing driving for closing the shutter and shutter opening driving for opening the shutter.

According to another characteristic of the present invention., the driving of the shutter comprises the shutter block drive putting the shutter on and at least any one among the shutter open driving opening the shutter.

Effects of the Invention

Effects of the Invention

With the configuration as described above, the digital photographing device according to embodiments of the present invention can stably control the power zoom operation.

Using the above-mentioned configuration, the digital photographing device according to the embodiments of the invention steadily controls the power zooming.

Specific details for carrying out the invention

Description of Embodiments

Since the present invention can apply various transformations and have various embodiments, specific embodiments will be illustrated in the drawings and described in detail in the detailed description. However, this is not intended to limit the present invention to specific embodiments, and should be understood to include all transformations, equivalents, or substitutes included in the spirit and scope of the present invention. In describing the present invention, if it is determined that a detailed description of related known technologies may obscure the gist of the present invention, the detailed description will be omitted.

The invention can add the various conversion and it can have various embodiments. And certain embodimen ts try to be exemplified in drawing and it tries to illustra te in the detailed explanation. But it has to be underst ood that this includes all conversions that are not and to limit the invention about the specific embodiment ar e included in thought and technology range of the pres ent invention, and the equivalent to the substitute. In describing the present invention, the detailed explanati on that the detailed description about the notification t echnique relating is the gist of the invention determine d that it can be cloudy is omitted.

Hereinafter, the embodiments according to the present invention decides to be particularly illustrated with refe will be described in description with reference to the accompanying drawings, the detail with reference to the accompanying drawings, and in the same or corresponding components Elements are given the same reference number and this rence to the attached view and it explanation of The drawing number in whi illustrates with refer ence to the attached view. Redundant will be omitted. ch the element which is identical or corresponds to is i

dentical decides to be given and the overlapped descri ption about this decides to omit.

[Configuration and operation of digital shooting device]

[The configuration and operation of the digital photographing device]

1 is a diagram showing a digital photographing apparatus 1 according to an embodiment of the present invention.

Figure 1 is drawing showing the digital photographing device (1) according to the embodiment of the inventio n.

Referring to FIG. 1 , a digital photographing device 1 according to the present embodiment includes an interchangeable lens 100 and a main body 200 . The interchangeable lens 100 has a focus detection function, and the main body 200 has a function of controlling the interchangeable lens 100 to drive the zoom lens 102 and the focus lens 105 .

Referring to Figure 1, the digital photographing device (1) according to this embodiment includes the intercha ngeable lens (100) and the main body part (200). The i nterchangeable lens (100) includes the lens (102) the main body part (200) controls the interchangeable lens (100) the focus detection function is included and the function operating the focus lens (105).

Interchangeable lens 100 (hereinafter referred to as #39# lens #39#) zoom lens driving actuator (103), zoom lens position sense the ' lens ') includes (104), focus lens driving actuator (106), zoom position detection sensor (107), ac mount (110), lens control unit (111), tuator (109) including lens control unit

The interchangeable lens (100) (it is hereinafter called optical system (101), the imaging optical system (101), zoom lens driving actuator (103), zoom lens position sensor (104), focus lens driving actuator (106), focus lens fecting sensor iris driving actuator (109), lens focus lens position defecting sensor (107), iris drive (112), lens mount (110), lens control unit (111), c. lens manipulation part (112).

The imaging optical system 101 includes a zoom lens 102 for zoom control, a focus lens 105 for changing a focal position, and an iris 108 . The zoom lens 102 and the focus lens 105 may be formed of a lens group combining a plurality of lenses.

The imaging optical system (101) comprises the zoom lens (102) for the zoom modulation, the focus lens (10 5) diversifying the focal point, and the iris (108). The z oom lens (102) and focus lens (105) comprises the lens group assembling multiple lenses.

The zoom lens position detection sensor 104 and the focus lens position detection sensor 107 detect the positions of the zoom lens 102 and the focus lens 105, respectively . The timing of detecting the position of the focus lens 105 may be set by the lens controller 111 or the camera controller 209 to be described later. For example, the timing of detecting the position of the focus lens 105 may be the timing of performing AF detection from an image signal.

The zoom lens position defecting sensor (104) and focus lens position defecting sensor (107) sense the po sition of the focus lens (105) and zoom lens (102). The timing sensing the position of the focus lens (105) can be set up by the lens control unit (111) or the camera control part (209) which will be described later. For exa mple, the timing sensing the position of the focus lens (105) can be the timing performing the auto focus dete ction from the image signal.

The zoom lens driving actuator 103, the focus lens driving actuator 106 and the iris driving actuator 109 are controlled by the lens controller 111 to operate the zoom lens 102, the focus lens 105 and the iris 108, respectively. drive In particular, the focus lens driving actuator 106 drives the focus lens 105 in the optical axis direction.

The zoom lens driving actuator (103) , and the focus lens driving actuator (106) and iris drive actuator (109) are controlled with the lens control unit (111) and the zoom lens (102), and the focus lens (105) and iris (10 8) the respectively are operated. Especially, the focus lens driving actuator (106) operates the focus lens (10 5) the optical axis.

The lens control unit 111 controls the overall operation of each configuration controlled. The lens control unit 111 transmits the loca 5 to the body unit 200 . the (111) is when there is a change in the position of the focus lens (105) , or information of the focus lens 105 from the camera control unit 209, the transmitted to the case or the camera control part 209 in which the main location information of the foc us lens (105) detected can be transmitted in

where the lens control unit 111 is included in the lens 100 is c . The lens control unit 111 transmits the detected location information of the focus lens 10 At this time, the lens controller tion information of the focus lens (105) sensed to the main body part (200). Then, in case it has the request of the location location information of the focus lens 105 detected when there is a request may be body 200 . change the lens control unit (111) is in the position of the focus lens (105) the the main body part (200).

The lens controller 111 performs power zoom operation, AF operation, varifocal correction operation, etc. according to the control from the body unit 200.

According to the lens control unit (111) is the control from the main body part (200), the power zooming and

is, the lens controller 111 is a power zoom performer, correction operation, etc. zoom performing unit and correction unit are not defined only by one lens parts are m performing unit, and the correction unit. But there will be an er unit by combining the pow. ot defined as the lens control unit (111) one and as the power zoom p performing unit and correction unit can be performed.

AF operation, the variable focus (varifocal) correction can be performed. That can be performed. That is, it can be an example of wealth. However, the power example of the lens control unit (111) is the power zoo control unit 111 , and a plurality of zoom performing unit that can function as a power zoom performing unit and correction multip le parts combine and the function and the correction unit are n

In addition, the lens controller 111 may include a storage unit capable of storing data therein, and various types of information such as lens data may be stored in the storage unit.

Moreover, the lens control unit (111) can include the storage storing data in the inside and the various infor mation including lens data etc. will be able to be stored in the storage.

The lens mount 110 has a lens-side communication pin and is engaged with a camera-side communication pin to be described later to be used as a transmission path for data and control signals.

The lens mount (110) includes the lens communication pin and it each other goes in gear with the camera com munication pin which will be described later and it is us ed as the transmission path including data, the control signal etc.

The lens control unit 112 is a control unit for performing a power zoom operation or a power focus operation. The lens control unit 112 is connected to the lens control unit 111 and applies a user's manipulation signal to the lens control unit 111 .

It is the manipulation part in which the lens manipulation part (112) performs the power zoom mani pulation or the power focus operation etc. The lens ma nipulation part (112) is connected to the lens control u nit (111) and the operation signal by the user is applied in the lens control unit (111).

Next, look at the configuration of the body portion 200 .

Next, the configuration of the main body part (200) is looked into.

The body unit 200 includes a view finder (EVF) 201, a shutter 203, an imaging device 204, an imaging device control unit 205, a display unit 206, an operation button 207, and a camera control unit 209 . , and a camera mount 208 .

The main body part (200) comprises the view finder (EVF) (201), the shutter (203), the image pickup devic e (204), the image pickup device control unit (205), th e display unit (206), the operation button (207), the c amera control part (209) and the camera mount (208).

The view finder 201 may have a built-in liquid crystal display unit 202 , and the captured image can be viewed in real time.

The view finder (201) the liquid crystal display (202) is built in and the image image-picked up can be looked a t on a real time basis.

The shutter 203 determines the time during which light is applied to the imaging device 204 , that is, the exposure time.

The shutter (203) determines the time, when the light is applied to the image pickup device (204) in other wo rds, the exposure time.

The imaging device 204 captures the image passing through the imaging optical system 101 of the lens 100. a video signal. The imaging device 204 includes a plurality of photoelectric conversion system 101 of the lens 100 and the image signal is produced. A vertical or/and arranged to the form of matrix flat transfer path, etc., which reads out an image signal by moving charges from the im. As the imaging device 204 , a charge and the complementary metal om the photoelectric transform portion and reads out th horizon transmission line etc. The CCD (charge coupled device) sensor, and the image pickup device (204).

The image pickup device 204 takes a picture of the image light and generates units arranged in a trix shape for each image light passing the imaging optical male-age pickup device 204 comprising the multiple photoel ectric transform portions perpendicularity moving the electric charge from coupled device (CCD) sensor, a xide semiconductor (CMOS) sensor, or the like may be used. e image signal or / and the CMOS (complementary metal oxide semiconductor) sensor lamp can be used as

The imaging device controller 205 generates a timing signal and controls the imaging device 204 to capture an image in synchronization with the timing signal. In addition, the imaging device control unit 205 sequentially reads out video signals in the horizontal direction when charge accumulation in each scan line is finished. The read horizontal direction image signal is used for AF detection in the camera controller 209 .

The image pickup device control unit (205) produces the timing signal and it controls so that it synchronizes in the timing signal and the image pickup device (204) t akes a picture. Moreover, the successively reads out t he horizontal direction image signal if the charge accum ulation at each scanning line is terminated. In the abov e-mentioned horizontal direction image signal stuck out is the camera control part (209), it is used for the auto

focus detection.

The display unit 206 displays various images and information. As the display unit 207, an organic light emitting display (OLED) or a liquid crystal display (LCD) may be used.

All kinds of the images and information the display unit (206) is displayed. The organic light emitting display de vice (OLED) or the liquid crystal display (LCD) etc. can be used as the display unit (207).

The operation button 207 is a part for inputting various commands from the user to operate the digital photographing device 1. The control button 207 may include various buttons such as a shutter release button, a main switch, a mode dial, and a menu button.

The operation button (207) is the part inputting the various kinds command from the user for the operation of the digital photographing device (1). The button whi ch is various to the operation button (207) with shutte r release button, main switch, mode dial, the menu but ton etc is include might.

The camera controller 209 calculates a contrast value by performing AF detection on the image signal generated by the imaging device 204 . In addition, the contrast value at each AF detection time according to the timing signal generated by the imaging device control unit 205 is stored, and the focus position is calculated using the lens position information transmitted from the lens 100 and the stored contrast value. . The calculation result of the focus position is transmitted to the lens 100 .

The auto focus detection is performed about the image signal in which the camera control part (209) is genera ted in the image pickup device (204) and the contrast value is produced. Moreover, the contrast value at eac h AF detection time according to the timing signal prod uced in the image pickup device control unit (205) is st ored and the focal point is calculated with the lens posi tion information transmitted from the lens (100) using t he stored contrast value. The result of computation of the focal point transmits in the lens (100).

The camera control unit 209 controls the number of releases from the operation button 207 according to the time request. The driving including the shutter (203), the iris release controller c. can be instructed. That is, it can be an example of t. camera control part 209 is the release control uni, and a plurality of parts are defined as the ca could function as a fisherman. mera control part (209) one formed.

According to the camera control part 209 is the release start request from the operation button 207, the shutter 203 and the aperture 108 (108), etc. may be instructed. That is, the camera controller 209 is an example of a However, the release control unit is not defined only as one camera control unit 209, he combined to form the release control part t. But the release control unit is not and multiple parts combine and the function as the release control unit can be per

The camera mount 208 has a camera-side communication pin. In addition , power may be supplied to the lens controller 111 through the camera mount 208 .

The camera mount (208) includes the camera communication pin. Moreover, the power can be supplie d through the camera mount (208) to the lens control unit (111).

Hereinafter, schematic operations of the lens 100 and the main body 200 will be described.

Hereinafter, the summary operation of the main body part (200) and lens (100) is illustrated.

When photographing a subject, the operation of the digital photographing device 1 is started by manipulating the main switch included in the manipulation button 207 . The digital photographing apparatus 1 first performs a live view display as follows.

When the subject is taken a picture of the main switch included in the operation button (207) is manipulated a nd the operation of the digital photographing device (1) is disclosed. First of all, the digital photographing d evice (1) performs the live view display like the next.

The image light of the subject passing the imaging optical system 101 is incident in the image pickup de 204 after passing through the imaging optical the shutter 203 to the open The incident subject light is converted into an system 101 . At this time, the shutter 203 remains open. vice (204). Then, it has transformed from the resulting video signal. The image pickup device 204 electrical signal in the imaging device 204 , and state. The incident object light is electric signal and du control unit 205 . Raw e to this, the image signal is operates according to a timing signal generated by the image pickup device 204 to the camera control unit 209 h the timing signal in which the image pickup device generated. It operates wit the image signal of the formed subject can be displayed in the 04) is generated in the image pickup device control uni. This operation is the (2 is converted into one data and output to the view finder 201 and display unit 206 the subject is displayed as tr and the live view image is continuously displayed live view display, and the live view display t (205). The generated image signal of display and it is outputted in the view finder (201) and display unit (206). Such as a video and ansformed from the camera control part (209) to data. enabling to display is consecutively indicated as the moving picture. operation is the live view display and the live view image indicated by the live view

After the live view display is performed, after the live view display, which is one of the control buttons 207, is performed if it becomes half-pressing (S1) the release button, the digital photographing device 1 operates during AF the shutter release button which is one of the operation button (207) with the half pressing (S1), the operation is performed by Th, and in the contrast AF method, the focus position and based on the calculation result (204) using the image signal produced. The controller is calculated in the contrast AF mode from the contras (209) . The contrast t value and the lens 100 the result of computation is operated to the provided in the lens mount 110 and the camera mount 208 . It is transmitted to transmits the information for the control of the focus lens (105) from the in the lens mount (110) and camera mount (208) as the intermediation it

digital p starts. A photographing device (1) discloses the AF operation. The AF is calculated from the value of the image pickup device in the contrast AF method, lens 100 is driven by the focal point . The contrast value is calculated in the camera camera controller 209 calculates information for controlling the focus lens 105 from the natural disposition. The contrast value is calculated in the camera control part (209) the lens controller 111 through the cam communication pin . era control part (209) contrast value to the lens control unit (111) it has the communication pin which is this equipped calculates

s.

The lens controller 111 performs an AF operation by controlling the focus lens driving actuator 106 based on the received information to drive the focus lens 105 in the optical axis direction. The position of the focus lens 105 is monitored by the focus lens position detection sensor 107, and feedback control is performed.

The focus lens driving actuator (106) is controlled based on the information which the lens control unit (1 11) receives and the focus lens (105) is driven the opti cal axis and the AF operation is performed. The positio n of the focus lens (105) is monitored with the focus le ns position defecting sensor (107) and the feed-back c ontrol is made.

When the zoom lens 102 is manipulated by the user and a zoom operation is performed, the position of the zoom lens 102 is detected by the zoom lens position detection sensor 104 , and the lens controller 111 determines the position of the focus lens 105. After changing the AF control parameters, AF is performed again.

In case the zoom lens (102) is concocted by the user the operation is performed the position of the zoom len s (102) is detected from the zoom lens position defecti ng sensor (104) and the lens control unit (111) change s AF control parameters of the focus lens (105) and AF is performed.

When the subject image is in focus by operating as described above, if it becomes shutter release button is the complete pressing performs exposure. At this

the state where the focus of the subject image is correct state operates an shutter release button is fully pressed (S2) and the digital photographing device (1) d the camera controller 209 once releases the shutter.

time, the

the photometric information acquired so far to the lens control unit 111 the information. The lens controller 111 controls the diaphragm driving actuator 109 which it so far acquires is transmitted in t, and controls the iris 108. Tighten to an control information unit 209 controls the shutter 203 based on the photometric act to open the shutter (204) as much as the exposure time and captures the iris (108) is tightened with the proper iris value. The camera control part (209) opened as

(S2) and the digital photographing device (1) performs completely closing, and exposure. Then, first of all, the camera control part is transmitted as aperture control based on yori 209 completely closes the shutter and the photometr y information appropriate aperture value. The camera control he lens control unit 111 as the iris information , and the appropriate n. The lens control unit (111) controls the iris drive image of the photographed subject (109) based on the iris control information and th. e controls the shutter (203) b ased on the photometry information and the shutter (2 04) is

the proper exposure time and the subj ect image in which photography is performed is capture d.

The captured image is stored in the memory card 212 after image signal processing and compression processing are performed. At the same time , the captured image is output to the view finder 201 and the display unit 206 displaying the subject . Such an image is called a quick view image.

The image signal processing and compression processing are performed and the capture image is stor ed in the memory card (212). Simultaneously, the capt ure image is outputted in the view finder (201) and the display unit (206) indicating the subject. It can be said to be such image the quick view image.

Through the above process, a series of photographing operations are ended. A series of photographic action is terminated by the above-mentioned process.

[Configuration of camera control unit]

[The configuration of the camera control part]

2 is a diagram showing a camera controller 209 according to an embodiment of the present invention .

Figure 2 is drawing showing the camera control part (209) according to the embodiment of the invention.

Referring to FIG. 2, the camera controller 209 according to the present embodiment includes a preprocessor 220, a signal processor 221, a compression/extension unit 222, a display controller 223, a CPU 224, and a memory. It may include a controller 225, an audio controller 226, a card controller 227, a power controller 228 , a main bus 229, and the like.

Referring to Figure 2, the camera control part (209) according to this embodiment may include .

The camera controller 209 transmits various instructions and data to each part through the main bus 229 .

The camera control part (209) transmits all kinds of the indications and data through the main bus (229) in eac h part.

The pre- processing unit 220 receives an image signal generated by the imaging device 204 and performs calculations of Auto White Balance (AWB), Auto Exposure (AE), and Auto Focus (AF). That is, the contrast value for focus adjustment, the AE evaluation value for exposure adjustment, and the AWB evaluation value for white balance adjustment are calculated.

The image signal in which the preprocessing unit (220) is generated in the image pickup device (204) is receiv ed and the AWB (Auto White Balance), the AE (Auto Ex posure), and the calculation of the AF (Auto Focus) ar e performed. That is, the contrast value for the focusin g adjustment, the AE evaluation value for the exposure adjustment, the AWB evaluation value for the white bal ance adjustment etc. are produced.

The signal processing unit 221 performs a series of image signal processing, such as gamma correction, to create a live view image or captured image that can be displayed on the display unit.

The signal processor (221) performs a series of image signal processing including the gamma correction etc. a nd the live view image or the capture image can displa y in the display unit is made.

The compression and expansion unit 222 compresses and expands the image signal on which image signal processing has been performed. In the case of compression, for example, the video signal is compressed in a compression format such as a JPEG compression format or an H.264 compression format. An image file including image data generated by the compression process is transmitted to and stored in the memory card 212 .

The compress/expanding part (222) performs compression and extension of the image signal in which the image signal processing is performed. In case of co mpression, the image signal is compressed to the comp ressed format including JPEG compressed format or the H.264 compressed format etc. for example. The video fi le including video data produced with the compression processing is transmitted to the memory card (212) an d it is stored.

The display controller 223 controls image output to a display screen such as the LCD 202 or the display unit 206 of the view finder 201 .

The display controller (223) controls the outputting image to the display screen including the LCD (202) or the display unit (206) of the view finder (201) etc.

The CPU 224 controls the operation of each part as a whole. Also, in the case of the digital photographing apparatus 1 according to FIG. 1 , the CPU 224 communicates with the lens 110 .

On the whole, the CPU (224) controls the operation of each part. Moreover, in case of the digital photographi ng device (1) according to fig. 1, the CPU (224) perfor ms the communication with the lens (110).

The memory controller 225 controls the memory 210 for temporarily storing data such as the captured image or image related information The memory 210 of provisionally storing data, including the capture image or the image related information etc . The memory controller 225 is photographed The audio controller (226) controls the card controller (227) is a memory card that stores the 226 controls the microphone or speaker 211 . is controlled and the audio controller 212 . y card (212) in which the card controller (227) stores image is controlled. connected image microphone or the speaker (211). Moreover, it controls the memory card

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The power controller 228 controls power of the digital photographing device 1 and supplies power to the lens controller 111 .

The power control unit (228) performs the electric power supply to the power control of the digital photog raphing device (1) and lens control unit (111).

[How to operate AF]

[AF operation method]

3 is a diagram explaining an AF operation in the contrast AF method. In the contrast AF method, an AF operation is performed by detecting a position of a focus lens at which a contrast value of a subject is maximized as a focus position. 3 , the horizontal axis represents the position of the focus lens, and the vertical axis represents the contrast value.

Figure 3 is a drawing illustrating the AF operation in the contrast AF mode. In the contrast AF mode, it is accor ding to detect the position of the focus lens in which f or the contrast value of the subject, the maximum is a s the focal point and the AF operation is performed. Th

e horizontal axis of fig. 3 shows the position of the foc us lens and the longitudinal axis shows the contrast val ue.

Graph (a) shows an operation when the peak of the contrast value is detected by driving the focus lens to one side at high speed from a state in which the contrast value is low due to the subject being largely out of focus.

The operation of the case where the focus of the subject deviates and it at high speed operates the foc us lens to one side and the graph (a) detects the peak of the contrast value from the state where the contras t value is low is shown.

Graph (b) shows an operation of reversing the driving direction of the lens and driving the lens at a lower speed compared to the driving speed in the operation of graph (a) to perform the peak detection again. By this operation, AF detection can be performed with higher precision.

The graph (b) inverts the lens operation direction and the operation of comparing in the driving rate at the op eration of the graph (a) and operating and again perfor ming the detection of the peak is shown. The auto foc us detection can be more performed with this operation to the high-resolution.

Graph (c) shows the driving toward the focal point according to the detected peak or the driving for the focal point according to the peak in. However, a device that normally drives a lens has backlash (b which the graph (c) is detected is shown. But generall y, as to the instrument, operating the lens the backlas ack lash) exists and the error is generated accordin difference occurs. Therefore, lash), and depending on the driving direction, the lens At the position of h (back the lens. In the operation of Th, the lens is driven to pass through the focus it is necessary to remove it, and graph (c) g to the driving direction in the position of the focal point in the operation of the graph (c). position. erefore, this need to be removed and the lens is operated in order to pass

In graph (d), the lens is driven in the same direction as the driving direction according to the operation of graph (b), in which the focus position is finally determined by reversing the lens driving direction, and the lens is stopped at the focus position.

The lens is driven to the direction like the driving direction according to the operation of the graph (b) in which the graph (d) again inverts the lens operation dir ection and which finally confirms the focal point and th e lens is stopped on the focal point.

The AF operation is performed by the above operation.

The AF operation is performed by the above-mentioned operation.

[Shooting motion]

[Photographic action]

Hereinafter, an operation of photographing a subject according to the above-described AF operation will be described.

Hereinafter, according to the above-described AF operation, it illustrates for the operation of taking a pic ture of the subject.

4 is a timing diagram illustrating a general AF method. That is, FIG. 4 is a timing diagram illustrating a case in which the driving of the focus lens, that is, the AF operation is not performed during release.

Figure 4 is a timing diagram the general AF method is shown. That is, figure 4 is a timing diagram showing th e case the driving of the focus lens, in other words, th e AF operation nots being performed in the release half way.

The horizontal axis of FIG. 4 represents time. The horizontal axis of fig . 4 shows time. The graph of the upper end most shows the position of the focus len. S1 show the photography action start signal from the use, and the release start and S2 are respectively s of the longitudinal axis of fig. 4. The S1 and the S2 the release start signal. The Auto Focus shows t, he driving state of the focus signal from the users. Auto Focus indicates the driving state of the focus lens, and 206 . When the OLED is for the part showing in gray, the focus lens is driven lens. And the state where indicates. OLED indicates the state of the display unit level is shown. OLED shows the state of the display unit (206). A black screen is at a high level, an object image is displayed on the display unit 206 , and a low opening or shielding the shutter 203. The subject image is indicated on the is displayed when leveling. #39#Shutter#39# is a shutter driving actuator (Mi 6) for the shaded part indicates when being the low level. The 'Shutter' shows a display unit (20) when OLED is the high level and the black screen is shown), and the shutter drive actuator (the not rake state (rest state), and the high level state in which the shutter 203 is driven. Also, the low level indicates the driving state of #39#Diaphragm#39# indicates the driving state of the diaphragm 108 nd the indicates the off state. illustrated) for opening the shutter (203) or shielding. A 108 is driven utter 203 is driven is shown. Moreover, it indicates the low level state where for the part showing in gray, the sh is the phase where the diaphragm the break state (the dormant state), and the high lev subject image is exposed status. #39#Expose#39# indicates the timing when the shutter is actually opened, on the imaging device 204 el show the OFF-state. The 'Diaphragm' shows the drivi

all. Data read indicates a timing at which the low level writes the image signal of the imaging device 204 to the storage medium.

ng state of the iris (108). And the state where for the part showing in gray, the iris (108) is driven is shown.
The shutter as to the 'Expose', is opened in fact and th e subject image shows the exposed timing on the imag e pickup device (204). The data read shows the timing when the low level writes the image signal of the image pickup device (204) in the storage medium.

Referring to FIG. 4, when the S1 signal is applied by user's manipulation, referring to Figure 4, the AF operation is disclosed if the S1 signal is applied described in FIG. 3, (t1). In advance, in fig. 3, as described above, the with the operation of the user, the AF operation starts (t1) . First, as A of detecting the peak of the contrast value at high speed. For the ope ration A detecting the peak of the contrast value at hi, which performed operation is performed. The peak position (t2) needs to be passed by a predetermined detection of the peak of the contrast value, the peak position (t2) is provided. the peak of the cont position (t3). And again the phase rast value. gh speed performs fine peak position detection . Similarly, with inverted in the position amount, so the driving direction of the lens is reversed at the detection of position is held by a predetermined amount n as the predetermined Therefore, the driving direction of the lens is performed to perform operation B, which point t5. At time t5, hich again performs the detail peak position detection i, (t3) passing by the peak positio, after detecting the peak position (t4), the peak position s performed. Similarly, in the point of time (t5) of being, operation amount. And the operation B w reverses the driving direction of the lens at the time driving the lens excessively after the peak position the peak position (t4) and the focus position is determined as the position at t4. towards the focal direction of the lens is inverted. In the t5 point of time, the focal point is C is performed, and operation D is performed by reversing the direction of and in order to prevent backlash, the driving to prevent back rush. doing the detection as the predetermined amount, the driving direction of the lens is again inverted and the operation D is perf ormed. settled as the position at the t4. The operation C is performed towards the focal point

When the level of S2 is low at the point in time when operation D is finished In the point of time (t7) that the operation D is terminated, in case (t7) (when there is a release request from the user), the release operation the level of the S2 is low (in that c ase, it has the demand of the release from starts. First, at t8, the shutter 203 is driven from an open state by a shutter the user) th e release motion is disclosed. First, in the t8, the shutt er (203) is actuator (not shown) to a closed state. A DC motor may be used to drive driven in the open state with the shutter ac tuator (the not illustrated) and it is the shutter 203 . When the drive of the DC motor starts, a large current done by the shieldi ng state. In the driving of the shutter (203), the DC m otor flows. Therefore, the driving of the diaphragm 108 starts when a should be used. The big current flows in the drivin g initiation of the DC predetermined time elapses (t9) after the start of the shutter drive, for motor. Therefore, the driving of t he iris (108) is started when passing with example, 15 ms . The driving of the diaphragm 108 is performed by the point of t ime (t9), for example, 15 ms that the predetermined ti me transmitting a command from the main body 200 to the lens 10 0 through passes after the shutter driving initiation. The drivin g of the iris (108) the communication pin of the lens mount 110 . The operation of the shutter transmits the command with the lens (100) through the communication pin of 203 is performed for a predetermined time, for example, 40 ms , after which the lens mount (110) from the main body part (200) it is according to and it enters a brake state (pause state). The aperture value of the aperture it is performed. The driving of the shutter (203) is made among the 108 is changed according to the luminance of the subject. However, the predetermined time, for example, 40 m s and the break state (the dormant driving time of the diaphragm 108 is completed within a predetermined time, for example, 70 ms . state) thereafter.

The iris value the iris (108) is changed by the brightnes s of the subject. But the actuating time of the iris (10 8) is completed within the predetermined time, for exa mple, 70 ms.

After driving of the shutter 203 and driving of the diaphragm 108 are completed, After the driving of the shutter (203) and driving of the iris (108) are finished an exposure operation is started (t10). After the elapse of time according to the the photo exposure action is discl osed (t10). The shutter is closed after the set shutter speed, the shutter is closed, thereby completing the exposure operation time-out ac cording to the shutter speed set up and therefore the photo (t 11). exposure action is completed (t11).

When the photo exposure action is completed , the read out of data is disclosed from the image pickup dev starts when the exposure operation is (204) (t12). After the predetermined time passes th, when the reading completed (t12). After a predetermined time elapses, for example, 110 ms ice of the shutter (203) is disclosed for example i 3) for the next shooting (t operation is completed (t13), the shutter 203 is driven to open the shutter (20 e driving described above, when the start current of the shutter actuator is pleated order to when the read operation after 110 ms is com 14). At this time, as when a predetermined time elapses, and the shutter 203 for the Operation when the read operation after 110 ms is complete , the aperture 108 is opened above, the driving of next photography to the o starts (t16). pen state (t14). Then, as described

to the open state of the iris (108) is started when the predetermined time therefore passes with the start ele ctic current of the shutter liquid Chiu (t16).

[Normal power zoom operation 1]

[The general power zooming 1]

5 is a timing diagram illustrating a driving method of a general power zoom operation.

Figure 5 is a timing diagram the driving method of the general power zooming is shown.

Referring to FIG. 5, Power Zoom represents the driving of a power zoom driving actuator by a user's zoom manipulation. Focus Compensation indicates a varifocal compensation drive that corrects the focus position by changing the position of the focus lens when the focus position is changed by the zoom operation.

Referring to Figure 5, the Power Zoom shows the driving of the power zoom drive actuator by the zoom manipulation of the user. When the Focus Compensatio n the focal point changed with the zooming , the varia ble focus (varifocal) correction driving altering the posi tion of the focus lens and amends the focal point is sh

own.

In the case of FIG . 5, a timing diagram for executing a power zoom operation when power consumption of the power zoom operation is small and there is a margin of power even during a release operation is shown. When the S1 signal is applied by a user's manipulation, the digital photographing apparatus 1 starts an operation (zt1). Subsequently, the AF operation starts, and detailed descriptions are omitted here, and it is assumed that the AF operation as described in FIGS. 3 and 4 is completed before zt2.

In case of fig. 5, in case it is the release motion middle ear the power consumption of the power zooming is sm all and it has the slack of electricity the timing diagram executing the power zooming is shown. The digital phot ographing device (1) discloses the operation if the S1 s ignal is applied with the operation of the user (zt1). Su bsequently, the AF operation is disclosed and here the detailed description is omitted and the AF operation as described above is previously completed in figures 3 an d 4 with zt2 and it assumes.

Meanwhile, a power zoom operation is initiated by the user's zoom manipulation (zt2). Then, a variable focus correction drive for correcting the position of the focus lens according to the zoom operation is started after a predetermined time elapses after the start of the power zoom operation. The predetermined time may be, for example, 15 ms .

In the meantime, the power zooming is disclosed by the zoom manipulation of the user (zt2). And after the predetermined time passes after the power zoom start up the variable focus compensation driving revising the position of the focus lens according to the zooming is s tarted. The predetermined time may be for example, 15

ms.

S2 signal is low level (L) by the user's release operation request the shutter 203 is initiated (z ve putting the shutter (203) on is disclosed and predetermine 08) after a predetermined time, for example, 15ms (zt5) . d time,

If for the S2 signal, the low level (L) is with the release motion demand of the user (zt3), when the shutter block dri becomes (zt3), shutter blocking driving to close the dri t4), and starts driving the aperture (1 ving of the iris (108) is disclosed from the for example, 15ms after (zt4) (zt5).

When the driving of the shutter 203 and the iris 108 is finished, if the driving of the iris 108 and shutter 203 is completed, the exposure is disclosed (zt6). If closed, the furnace nt of the shutter speed is terminated, the shutter is pu the cou it (zt6). When the count of the shutter speed is finished, the shutter is terminated (zt7) and the read out of data is disclosed (zt8). light is terminated (zt7), and data reading is started (zt8). t on and the exposure is

When the data reading is finished (zt9), shutter opening driving to open the shutter 203 is started (zt10), and driving to open the diaphragm is started after a predetermined time, for example, 15 ms (zt11). Then, when the driving of the shutter 203 and the aperture 108 ends (zt12), the next photographing operation proceeds.

If the data read is terminated (zt9) , the shutter open driving opening the shutter (203) is disclosed and the d riving opening the iris after the predetermined time, for example, 15ms is started (zt10) (zt11). And it goes ov er to the next photographic action if the driving of the iris (108) and shutter (203) is completed (zt12).

A general power zoom operation is performed by the above method. The general power zooming is performed by the above mentioned method.

[Power zoom operation 1-1 according to an embodiment of the present invention]

[The power zooming 1-1 according to a preferred embodiment of the present invention]

6 is a timing diagram illustrating a method of driving a power zoom operation according to an embodiment of the present invention.

Figure 6 is a timing diagram showing the driving method of the power zooming according to the embodiment of

the invention.

In the case of FIG . 6, the power consumption of the power zoom operation is large, and the old shutter 203 In case of fig. 6, the power consumption of the power zooming is great and the timing diagram which does not indicate the timing that does not drive the power zoom operation at the same time. 6 is described centering on the difference from FIG . 5, when the S2 signal is applied (zt3) by the user perform the driving of the power zooming is shown in th user's manipulation, the power zoom operation e driving initiation of the shutter (203). If fig. 6 is illustrated around the difference from fig. 5 Stop if the S2 signal. The power zoom operation is stopped at the same time as the S2 the driving of the focus lens 105 is unexpectedly stopped with the S2 signal signal is applied, and the zooming is stopped. The power zooming is simultan, so correction is ter minated in order to achieve the exact variable focus compensation authority until the calibration is finished. But until t lasts. he driving of the focus lens (105) the at the stop position of the zoom lens it is continued.

After stopping the power zoom operation, the release operation is started. Shutter blocking driving to close the shutter 203 is started (zt4), and driving of the diaphragm 108 is started after a predetermined time, for example, 15 ms (zt5).

The release motion is disclosed after the stopping of the power zooming. The shutter block drive putting the shutter (203) on is disclosed and the driving of the iris (108) is disclosed after the predetermined time, for exa mple, 15ms (zt4) (zt5).

After the driving of the iris 108 starts, driving of the power zooming operation resumes after a predetermined time, for example, 15 ms The driving of the power zooming is power d time, for example, 15ms (zt13). And then the driving of the focus lens reopened after the driving initiation of the iris 108 after the predetermined (zt13). and zoom operation is resumed, for driving the variable focus correction tart of The 105 is disclosed after a predetermined time, for example, 15 ms , after the driving of the time, for example, 15ms (zt14). power zooming for the variable focus compe (zt14). nsation driving with the predetermined

Operations from zt6 to zt9 are the same as those in FIG. 5 .

The operation to the zt6 to the zt9 is identical with fig. 5.

When data reading is finished (zt9), the power zoom operation is temporarily stopped to drive the shutter 203 (zt9). After stopping the power zoom operation, shutter opening and aperture driving are sequentially started (zt10 and zt11).

In order to operate the shutter (203) if the data read is terminated (zt9), first of all, the power zooming is st opped (zt9). Then the driving of the iris and shutter op en driving is successively disclosed with the stopping o f the power zooming (zt10, zt11).

Then, driving of the power zoom operation is resumed after a predetermined time, for example, 15 ms after the driving of the iris 108 is started (zt15), and then driving of the focus lens is started to drive the variable focus correction (zt16).

And the driving of the power zooming is reopened after the predetermined time, for example, 15ms (zt15) after the driving of the iris (108) is begun and subsequently the driving of the focus lens is disclosed for the variabl e focus compensation driving (zt16).

[Power zoom operation 1-2 according to an embodiment of the present invention]

[The power zooming 1-2 according to a preferred embodiment of the present invention]

7 is a timing diagram illustrating power zoom driving according to another embodiment of the present invention.

Figure 7 is a timing diagram showing the power zoom driving according to the dissimilar embodiment of the in vention.

7 also shows a timing diagram in which the driving of the power zooming operation is not performed when the driving of the shutter 203 is started because the power consumption of the power zooming operation is large.

Fig. 7 the , moreover, the power consumption of the power zooming is great and the timing diagram which d oes not perform the driving of the power zooming is sh own in the driving initiation of the shutter (203).

Referring to FIG. 7 centering on the difference from FIG. 6, when the S2 signal is applied by a user's manipulation (zt3), the power zoom operation is stopped. The power zoom operation stops at the same time as the S2 signal is applied, but the driving of the focus lens 105 continues until the correction is completed in order to perform accurate variable focus correction at the stop position of the zoom lens .

If fig. 7 is illustrated around the difference from fig. 6 if the S2 signal is applied with the operation of the user (zt3) , the power zooming is stopped. The power zoomi ng is simultaneously stopped with the S2 signal authori ty. But until the driving of the focus lens (105) the corr ection is terminated in order to achieve the exact varia ble focus compensation at the stop position of the zoo m lens

, it is continued.

After stopping the power zoom operation, the release operation is started. Since operations in zt4 to zt12 are the same as those in FIG. 6, descriptions thereof are omitted.

The release motion is disclosed after the stopping of the power zooming. The operation at the zt4 to the zt 12 omits the description since it is identical with fig. 6.

Meanwhile, in the case of the present embodiment, the power zoom operation is not performed while the S2 signal is at the low level (L) by the user's manipulation. Therefore, unlike the embodiment of FIG. 6 , once the power zoom operation is stopped, the power zoom operation is not resumed.

In the meantime, in case of the present preferred embodiment, while the S2 signal is the low level (L) the power zooming is not performed with the operation of t he user. Therefore, the power zooming is not again res umed first of all, if the power zooming is stopped to the embodiment according to fig. 6.

As described above, in the digital photographing device 1 according to the present embodiments, when there is a request to start a release operation while performing a power zoom operation, it is determined whether to stop the power zoom operation according to the power consumption of the power zoom operation, It becomes possible to control the power zoom operation more stably.

As described above, in the digital photographing device (1) according to these embodiments, stopping accepta nce and rejection of the power zooming are determined among the performance of the power zooming accordin g to the case where the case have the start request o f the release motion, and the power consumption of th e power zooming and the power zooming is more steadil y controlled.

[Power zoom driving method according to an embodiment of the present invention]

[The power zoom driving method according to a preferred embodiment of the present invention]

003c# operation of the body part 200003e #

003c# main body part (200) operation 003e#.

8 to 10 are digital photography chapters Figures 8 through 10 are the flowchart method. Figure al photographing device (1) according to the embodime 11 is a drawing showing lens d plane. ata according to the embodiment of the invention

showing the control method of the main body part 200 of the digit 1 according to an embodiment of the present invention It is a flow chart showing the control figure representing lens data according to an embodiment of the invention. Figure 11 is

Referring to FIG. 8 , the body unit 200 first requests transmission of lens data from the lens 100 (S101) and receives the lens data through communication with the lens 100 (S102). 11 will be described here .

Referring to Figure 8, first the main body part (200) requires the transmission of lens data from the lens (10 0) (S101) and lens data are received through the lens (100) and communication (S102). Here, it illustrates for fig. 11.

Referring to FIG . 11 , Focus Speed is data representing the AF driving speed of the lens 100 . For example, the driving speed may be 10 steps from FS1, which is the lowest speed, to FS10, which is the highest speed. The driving speed can be expressed as the number of steps that can be driven in one second. Here, the number of steps means the lowest unit of position control during AF driving of the lens 100 . In the case of FIG . 11 , it is shown that the lens 100 is a lens that can be driven at 2000 pps (pulse per second) in FS1 and 6500 pps in FS10. When the body unit 200 instructs the lens 100 to drive the focus lens 104 , it selects and instructs the optimal driving speed from the speed information, and the lens 100 drives the focus lens 104 at the indicated speed.) is performed.

Referring to Figure 11, it is data in which the Focus Speed shows the AF driving rate of the lens (100). For example, the FS10 which is the maximum speed from th e FS1 in which the driving rate is the minimum rate can be 10 step. The driving rate can show in terms of the d rivable number of step for 1 second. Here, the number of step means the lowest unit of the position control in the AF driving of the lens (100). In case of fig. 11, the lens (100) shows in terms of 6500 pps in the FS1 in 20 00 pps (pulse per second), and the FS10 being the driv able lens. When the main body part (200) indicates the driving of the focus lens (104) to the lens (100) , the o ptimal driving rate is chosen from the velocity informati on and it indicates and the driving of the focus lens (1 04) is performed to the speed in which the lens (100) i s indicated.

Focus Sensitivity is a coefficient that converts defocus, which is the amount of focal deviation of the lens, into the number of driving steps, and represents the sensitivity of the focus driving amount to the lens driving amount. Focus Sensitivity has data for each focal length of a zoom lens. For example, at the focal length Z 1, it is 0.32 pulse/micron, indicating that it is necessary to drive as much as 0.32 pulse to drive 1 micron defocus.

It is the coefficient which the Focus Sensitivity is crossed with the focus of the lens converts the defocu s which is the amount into the drive step number and t he sensitivity of the focus drive amount about the lens operation amount is shown. The Focus Sensitivity has f ocal distance sort raw data of the zoom lens. For exam ple, in the focal distance Z1, it is 0.32 pulse / micron a nd in order to operate the defocus of 1 micron, it show s as 0.32 pulse to operating.

Backlash is the amount of backlash generated when the driving direction of the focus lens 104 is reversed, and its unit is pulse. In the case of this embodiment, for example, a back rush of 30 pulses occurs.

It is the backlash amount which is generated when the Backlash inverts the driving direction of the focus lens (104) and the unit is pulse. In case of the present pref erred embodiment, for example, the backlash of 30 puls e is generated.

Actuator is It is data in which the Actuator shows the kind of the data representing the type of AF driving actuator. DC motor, step motor, ultrasonic motor, voice drive actuator of the AF driving. Data selecting any on Among the actuators of the DC motor, step motor, ultr, among the actuators such as coil motors, ultr is stored. In the case of this embodiment, a stepper motor is used. asonic motor, the voice coil motor etc are stored. In case of the present preferred embodiment, the stepper motor is used.

Lens Power is data indicating whether the power consumption used in the actuator of the lens 100 is greater than or equal to a reference value. For example, the reference value may be 2A. If the lens power data is 0, it is below the standard value, and if it is 1, it can indicate that it exceeds the standard value.

It is data which show whether the power consumption in which the Lens Power is used in the actuator of the l ens (100) etc. is the reference value or greater or not.
For example, the reference value can be 2A. If it is dat a of the Lens Power 0 it is the reference value or less and it can show exceeding the reference value if it is 1.

Open Iris is the data of the open F value (FNo) for each focal length. Since the aperture F-value is changed by the zooming operation of the zoom lens 102, it may have F-value data according to the focal length.

The Open Iris is data of each focal distance opening F number (FNo). It can have according to the focal dista nce with data of F number because the opening F num ber changes with the zooming action of the zoom lens (102).

Focus Length represents focal length information at each focal length position. In the case of this embodiment, for example, the focal length range is divided into 8, the wide lens is 28 mm, and the tele lens is 105.1 mm .

The Focus Length shows the focal distance information at each focal distance position. In case of the present preferred embodiment, for example, 8 division, and wide are the focus distance range the lens in which 28mm, a nd the tele are 105.1mm.

The above-described lens data is exemplary and may be different depending on the type of lens 100 .

Above-described lens data are illustrative and it can be different according to the kind of the lens (100).

Meanwhile, although not shown, prior to communication with the lens 100, the lens 100 is permitted a power zoom operation.

In the meantime, although not illustrated, the lens (100) the power zooming is previously permitted with t he communication with the lens (100).

Returning to FIG. 7 again , after acquiring lens data, the body unit 200 drives the imaging device 204 (S103) and displays a live view image on the display unit 206 (S104).

Again, it returns to fig. 7 and the main body part (200) performs lens data the driving of the image pickup devi ce (204) after doing the captured (S103) and the live view image is indicated in the display unit (206) (S10 4).

Subsequently, it determines whether there is a power zoom operation by the user (S105). The determination is to zoom manipulation by the user or not (S105) . The info is received and executed. In the absence of power zoom manipulation, the normal Amation of the power zoom manipulation is received from the lens (100) and determination performs. In the case F, the operation is performed. without the power zoom manipulation, the general AF o peration is performed.

On the other hand, when there is power zoom operation, the aperture value set by the user

In the meantime, it is the mode tightening the iris with the case where has the power zoom manipulation, and is a mode that displays a live view image by tightening the aperture, or a mode that displays a live view image with the aperture open. the iris value which the user sets up and indicates the live view image whether it determines whether it is the (S106). That is, it is determined state and indic, the preview mode records the live view image with the whether it is in preview mode. Here mode in which the iris is or to the open whether it is the preview mode or not. Here, even in ca se the preview mode aperture value set by the user (S106). That is, it determines even if it is below zero. is appli takes a picture of the moving pict ure with the iris value which the user sets up it

ed.

In the case of the preview mode, the position of the aperture 108 at the current focal length is calculated (S107). Even when mechanically having the same diaphragm diameter, a zoom lens usually changes its effective F-number according to its focal length. This amount of change is calculated and obtained from Open Iris information received from the lens 100 .

In case it is the preview mode the position of the iris (108) at the current focal distance is calculated (S10 7). In case of having the same aperture diameter gener ally the validity F number the zoom lens changes accor ding to the focal distance. This the amount of change i s calculated from the Open Iris information received fro m the lens (100) and it saves.

It is determined whether it is necessary to change the current diaphragm diameter (S108), and if driving is necessary, it is determined whether Lens Power is 0 and current consumption of the lens 100 is 2A or less (S109) . In the case of 2 A or less, the power zoom operation and driving of the diaphragm 108 can be performed at the same time, and driving of the diaphragm 108 is instructed to the lens 100 (S110).

It determines whether the current aperture diameter need to be changed and if necessary, the Lens Power of the driving determines as 0 (S108) whether the pow er consumption of the lens (100) is 2A or less (S109).

The driving of the iris (108) and power zooming can be simultaneously performed in case of being 2A or less. T he driving of the iris (108) is indicated to the lens (10 0) (S110).

On the other hand, the maximum that can be supplied from the main body 200 to the lens 100 exceeds 2A, the iris (10 erefore the iris (108) is not operated in case the power Moreover, in case it is not necessary to drive the iris 108, the eview mode the iris operate the iris (108).

On the other hand, the maximum current can supply to the lens (100) from the main body part (200) is 2A. Since the Th current is 2A, if the current consumption 8) is not driven. Also, when not in preview mode, aperture consumption exceeds 2A. 108 is not operated even in case there is no need to drive the iris 108 . of not have to

Next, S2 becomes the low level (L) and determines whether there is a release motion start request Next, the S2 determines whether the low level (L) is and it has release operation t (S111). In the case without the start request of the, the step. If there is a request at On the oth, it determines whether Lens Power is 0 is 1, the current consumption of the lens 100 exceeds 2A case have the start (S113) and the Lens Power 0 or not (S112). In case it is the Lens release (100) hang release operation starts immediately. s out 2A to air the driving of motion is directly disclosed in case it is the Lens Power 0.

the start request of the release motion or no (S111). There is no request to start the process returns to step S101. On the other hand, dog release motion, it returns to the S101 (S11 er hand, it determines whether it is the case where the 2). When the Lens Power request of the release motion, and the driving of the power zoom operation is prohibited operation is initiated. When Lens Power is 0, Power 1 the power consumption of the lens the power zooming is forbi dden (S113) and the release motion is disclosed. The release

Next, Fig. 9 will be described.

Next, it illustrates for fig. 9.

Referring to FIG . 9, when the release operation starts , a black screen is displayed on the display unit 206 , and the user is informed that the release operation is in progress (S201). When OLED is used for the display unit 206 , since OLED is a self-emissive display element, power consumption is almost proportional to display luminance. Therefore, it is possible to increase power supply to other actuators during the release operation by reducing the required power by displaying a black screen.

Referring to Figure 9, when release motion is disclosed, the black screen is indicated in the display unit (206) a nd the release motion heavy responsibility is indicated t o the user (S201). The case and OLED where OLED is used for the display unit (206) are the self-emitting dis play device. Therefore the power consumption is nearly in proportion to the indication luminance. Therefore, by indicating the black screen it is caused by and the requ ired power is reduced and it is increased the power sup ply including the actuator etc. among the release motio n dissimilar.

The imaging device 204 converts to the still screen capture mode (S202), and starts shutting off the shutter driving to block the open shutter 203 to display a live view image (S203). Since the actuator for driving the shutter 203 uses a DC motor, a large starting current is required at the start of driving. Therefore, after waiting for a predetermined time, for example, about 15 ms after starting driving (S204), the lens 100 is instructed to start driving the diaphragm 108 (S205).

The image pickup device (204) converts into the still picture capture mode (S202) and the shutter block driv e blocking the shutter (203) which it is done by the op en state for the display of the live view image is disclos ed (S203). Since the actuator operating the shutter (2 03) uses the DC motor the start electic current large in the driving initiation is required. Therefore, the driving i nitiation of the iris (108) is indicated to the atmosphere (S204) going after the driving initiation with the predet ermined time, for example, about 15 ms to the lens (10 0) (S205).

In addition, in order to have leeway in the start-up current required for the power zoom operation, the power zoom operation is allowed after waiting for about 15 ms after the start of driving the aperture 108 (S207). When the power zoom operation is set to be prohibited in step S113, the driving of the power zoom operation by the lens 100 is resumed in step S207 .

Moreover, in order that it has room on the start electic current required for the power zooming the power zoom driving is permitted after about 15 ms is queued after t he driving initiation of the iris (108) (S207). In the S11 3 step, in case it sets up in order to forbid the power z oom driving the driving of the power zooming by the len s (100) is reopened with the S207 step.

Again , the shutter brake hangs after doing about 25ms atmosphere (S208) (S209). And about 15 ms is queued (S209). And waits for about 15 ms for the driving of the iris 108, and determines whether the driving of the iris 108 has time out of the iris 108 (S210) and it determines (S210) to complete the (S211). ended es whether the driving of the iris (108) was completed is determined

(S211).

If the driving of the iris 108 is not finished, since a mechanical error has occurred, it proceeds to a step for error processing. When the driving is normally terminated, an exposure start step is performed.

In case the driving of the iris (108) is not completed it is the state where the mechanical error occurs. Theref ore it progresses as the step for the error handling. It progresses as the exposure beginning stage in case the driving is normally terminated.

Next, Fig. 10 will be described.

Next, it illustrates for fig. 10.

Referring to FIG . 10 , when the exposure operation starts, the first curtain or the first curtain of the shutter is moved (S301). As a result, the count of the exposure time starts (S302). When the set exposure time elapses, the second or second curtain is driven (S303).

Referring to Figure 10, 1 film or the line film of the shutter is operated to the when photo exposure action is disclosed (S301). Therefore, the count of the exposu re time is initiated (S302). If the exposure time set up passes, the second film or the thick film is operated (S 303).

When the driving operation of the first and second scenes is completed , a video signal is read from the CMOS image sensor or the like of the imaging device 204 (S304). When the read operation for all pixels is finished (S305), image signal processing for accumulating the image as an image file is started (S306).

The image signal when the driving operation of the second film and 1 film are completed is read out from t he CMOS image sensor etc. is the image pickup device (204) (S304). If the read operation about all points is t erminated (S305) , the image signal processing for acc umulating the image as the video file is disclosed (S30 6).

Next, it is determined whether Lens Power is 0 (S307), and Next, it determines (S307)s whether it is the Lens Power 0 and the driving of the power being not 0 (S308). And the driving openi starts driving to open the shutter zooming is forbidden if it is not 0 (S307). to do (S308). And then en in case of and waits for about 15 ms (S310). After the wait, aperture d (S309) and it 203 for shooting, ng the shutter 203 for the next photography is starte (S309), ini 108 (S31 tiation of the driving which then opens the iris (108) th 1), waits with about 15 ms (S310). Instructs the lens 100 to start driving to open the is permitted (S313) and e atmosphere is indicated to the lens (100) (S311). waits for about 15 ms , (S312), and then power zooms The driving of the operation (S313). it waits and then the driving of the power zooming is permitted with (S312)

After permitting driving of the power zoom operation, about 25 ms is waited (S314), and the driving of the shutter 203 ends and the shutter brake operates (S315). Then, it waits for about 25 ms (S316).

Then the driving Huh of the power zooming stands by with about 25 ms (S314) and the driving of the shutter (203) is completed and the shutter brake operates (S3 15). And it waits with about 25 ms (S316).

Next, it is determined whether S1 is a low level (L) (S317). Next, it determines whether the S1 is the low level (L) or not (S317). The AF operation is again the high level ase the S1 is the low level and since the digital photog, the disclosed in c If the level is right, the AF operation starts again, and if S1 is is not manipulated in case the S1 is ep). the high level it progresses as the digital photographing device 1 is not operated, so sleep (Sle raphing device (1) slip (Sleep) state.

The power zoom, shutter 203 and aperture 108 operations according to the embodiment of the present invention are performed in the main body 200 by the method described above .

The power zoom according to the operation of the invention, and the operation of the iris (108) and shutt er (203) are performed by the method as above in the main body part (200).

003c#Lens 100 operation003e#

Hereinafter, the operation of the lens 100 will be reviewed.

12A to 15 are flowcharts illustrating a method of controlling the lens 100 of the digital photographing apparatus 1 according to an embodiment of the present invention .

Referring to FIGS. 12A and 12B , when driving of the lens 100 is initiated, whether or not (S401). When not performing the power zoom operation, the power zoom is being operated. The ower zoom is controlled in advance

When the power zoom is being operated, it determines whether the driving of the power zooming was inhibited from the main body part (200) in case th operation is prohibited (S403). Power zoom e power zoom was manipulated determined whether the current AF operation is driven and the driving of operation is driven (S40 4).

If the AF operation is not driven, a flag during power zoom control is set (S408). Then, driving of the power zoom operation starts (S409). At this time, the main body performs driving of the AF operation.

On the other hand, when power zoom is manipulated during AF operation, power Therefore, in step S404, the AF operation is g the driving of the AF operation is stopped (S405), and the AF operation is driven flag is released the AF operation is release is transmitted to the body unit 200 (S407). The the AF is transmitted, a flag during power zoom control is set (S408). of the zoom operation starts (S409). dy part (200) (S407). Flag is set up (S408). And the driving of the power zooming is started (S409).

If there is no zoom operation in step S402, or if driving of the power zoom operation is prohibited in step S403, the process proceeds to step S501 of FIG. 13 .

Meanwhile, in step S401, when the power zoom is being controlled, it is determined whether driving of the power zoom operation is prohibited (S410). When the driving of the power zoom operation is not prohibited, it is determined whether or not the power zoom operation is currently being performed (S411).

The case where the power zoom is manipulated, and continues to perform Then, the variable focus correction amount is calculated (S412), and the power (S413). About 15ms is Waiting for 15ms (S414), and when 15ms elapses, zooming operation (S415). By not starting the driving of the variable focus of 15 ms , the zoom lens 102 and the focus lens ion is started if 15 ms is not overlapped and he variable focus compensation is not disclosed current is overlapped and the driving is not generated the drive starting point

003c# lens (100) operation 003e#.

Hereinafter, it inspects closely about the operation of the lens (100).

Figures 12a through 15 are the flowchart showing the control method of the lens (100) of the digital photogra phing device (1) according to the embodiment of the in vention.

Referring to figures 12a and 12b, when the driving of the lens 100 is disclosed, it determines whether the p is controlling power zoom first. It is determined or not (S401). In case of not performing the power zooming it determines whether or not (S402). whether the power zoom is manipulated or not (S402).

from the main body part 200. It determines whether the driving of the or not (S403). If the driving of the in case operation is not inhibited, it is the power zooming is not inhibited it detects (S404). rmines whether the current AF

Flag is set up among the case in which the AF operation is not driven, and the power zoom control (S 408). And the driving of the power zooming is started (S409). Then, the main body part performs the driving of the AF operation.

case the power zoom is manipulated amon zoom is preferentially performed. operation. Therefore, in the S40, if it is determined that the operation is running, the AF (S406). Then, an AF operation termination signal riven it is *** (S405) and flag AF operation end signal is sent within the AF operation driving (S406). And after Then, the far end-of-operation signal is transmitted with the main bo and the driving among the power z oom control after the AF end-of-operation signal is tra nsmitted

In the S402 step, it progresses as the S501 step of fig. 13 in case the driving of the power zooming is inhibited in the case without the zoom manipulation or the S403 step.

In the meantime, in the S401 step, it determines whether the case where the power zoom was controlle d, and the driving of the power zooming were inhibited or not (S410). In case the driving of the power zoomin g is not inhibited it determines whether the power zoo m is manipulated in the present (S411).

the power zoom operation when the power zoom is being manipulated. (S412) and the driving starts (S413). About of the power zooming is started variable focus correction is queued after the driving initiation of the power beam (S414) and the driving of the variable focus compensation before the lapse passed (S415). The driving start point 105 is shifted so that the starting current is before the progress of 15 ms. In that way it crosses each other and the start electic of the foc

On the other hand, if the driving of the power zoom operation is prohibited in step S410, or if the power zoom is not manipulated in step S411, the power zoom operation is stopped (S416). Then, the final variable focus correction amount is calculated at the position where the zoom lens 102 is stopped (S417), and the focus lens 105 is driven to perform the final variable focus correction (S418). During power zoom control, the flag is released (S419).

Next, Fig. 13 will be described.

Referring to FIG . 13 , when driving of the lens 100 starts, it is determined whether an AF operation is currently being driven (S501). If the AF operation is being driven, it is determined whether the driving of the AF operation has ended (S502). When the driving is terminated, the AF operation driving flag is released (S503), and an AF operation termination signal is transmitted to the body unit 200 (S504).

If the current AF operation is not driven or the AF operation is terminated whether the aperture 108 is being operated (S505). operated or the iris (108) operation of the iris 108 (se of operating the iris 108) has ended (S506). (S506). The F flag during aperture driving is released (S507), and the th is transmitted to the main body 200 (S508). e driving is completed and

If the iris 108 is not currently driven or the iris 108 is not driven, it is determined whether there is a request for transmitting lens data from the body unit 200 (S509). If there is a request for transmitting red data, lens data is set (S510), the set lens data is transmitted to the main body 200 (S511), and the loop of steps S501 to S510 is repeated again.

Next, Fig. 14 will be described.

Referring to FIG . 14 , when there is no request to transmit lens data from the body unit 200 , it is determined whether there is a request to stop the AF operation (S60 1). When there is a request to stop the AF operation, the driving of the focus lens 10 4 is immediately stopped (S602), and the flag during driving of the focus lens is released (S603). Then, an AF operation termination signal is transmitted to the main body 200 (S604).

On the other hand, if there is no AF operation stop request, it is determined whether there is an AF operation drive request (S605). If there is a request to drive the AF operation, it is determined whether power zoom is being controlled (S606). When the power zoom is not being controlled, the driving speed and driving amount of the AF operation are set according to the instructions from the main body 200 (S607), and a flag during AF operation is set (S608). Then, driving of the AF operation starts (S609). Although not shown, the AF operation can be driven by a step motor, and the AF operation can be automatically performed by setting the speed and driving amount to the driver IC .

us lens (105) and zoom lens (102).

In the meantime, in the S410 step, in case the driving of the power zooming is inhibited or the case in which t he power zoom is not manipulated, and the power zoo ming are stopped in the S411 step (S416). And the fina l variable focus offset at the position in which the zoo m lens (102) stops is calculated (S417) and the focus l ens (105) is operated in order to achieve the final varia ble focus compensation (S418). Flag releases among th e power zoom control (S419).

Next, fig. 13 is illustrated.

Referring to Figure 13, when the driving of the lens (100) is disclosed, it determines whether the current A F operation operates or not (S501). In case of operatin g the AF operation it determines whether the driving of the AF operation was completed or not (S502). Flag is withdrawn within the AF operation driving (S503) in cas e the driving is completed and the AF end-of-operation signal is transmitted with the main body part (200) (S5 04).

If it determines whether the current AF operation is not, it is determined whether the iris (108) is operated in case the driving of the AF operation is completed or not (S505). In ca If the iris 108 is being driven, it determines whether the When driving is completed, driving of the iris (108) was completed or not aperture driving end signal lag is withdrawn within the iris driving (S507) in case the iris driving end signal is t ransmitted with the main body part (200) (S508).

And the current iris (108) is not operated or in case the driving of the iris (108) is completed it determines f rom the main body part (200) whether it has the transf er request of lens data or not (S509). Lens data are se t up in case it has the transfer request of *** data an d lens data set up (S510) are transmitted with the mai n body part (200) (S511) and the loop of the S501 ste p to the S510 step is again repeated.

Next, fig. 14 is illustrated.

Referring to Figure 14, it determines from the main body part (200) whether it has the case without the tr ansfer request of lens data, and the stop request of th e AF operation (S601). The driving of the focus lens (1 04) is immediately stopped (S602) in case it has the AF suspend demand and flag is withdrawn within the focus lens driving (S603). And the AF end-of-operation signal is transmitted with the main body part (200) (S604).

In the meantime, in the case without the AF suspend demand, it determines whether it has the AF operation drive demand (S605). It determines whether the case where the case have the AF operation drive demand, a nd the power zoom are controlled or not (S606). In cas e the power zoom is not controlled the driving rate of t he AF operation, and the driving amount is set up acco rding to the indication from the main body part (200) a nd flag is set up among the AF operation driving (S607)

(S608). And the driving of the AF operation is started (S609). Although not illustrated, the driving of the AF o

peration can be performed by the stepper motor and th e AF operation can be automatically performed by setti ng the speed, and the driving amount to the driver IC.

On the other hand, if there is no AF operation driving request in step S605, it is determined whether there is an aperture driving request (S610). When there is a request for driving the aperture, the driving speed and driving amount of the aperture 108 are set according to the instruction from the main body 200 (S611), and a flag during driving of the aperture is set (S612). Then, the operation of the diaphragm 108 starts (S613). If there is no request for driving the aperture in step S610, the process proceeds to the lens driving start step for control of the next loop.

On the other hand, in the S605 step, it determines whether it has the case without the AF operation drive demand, and the iris drive demand (S610). According t o the case where the case have the iris drive demand, and the indication from the main body part (200), the d riving rate of the iris (108), and the driving amount is s et up and flag is set up among the iris driving (S611)

(S612). And the driving of the iris (108) is started (S61 3). In the S610 step, it again progresses as the lens op eration beginning stage in the case without the iris driv e demand for the control of the next loop.

Next, Fig. 15 will be described.

Next, fig. 15 is illustrated.

15 shows a case of receiving data from the body unit 200 . Data from the main body unit 200 is interrupted according to an update request by the main body unit 200 .

Figure 15 shows in that case, it receives data from the main body part (200). According to data from the main body part (200) is the update request by the main bod y part (200), it is performed to the interrupt handling.

When a command is received from the body unit 200 (S701), data is set according to the command received through interrupt processing (S702). When the data setting is finished, the interrupt processing loop is exited (RETI, Return from Interrupt Routine) (S703).

If the command is received from the main body part (200) , data are set up according to the command rece ived with the interrupt handling (S701) (S702). It is go ne from the interrupt handling loop (RETI, Return from I nterrupt Routine) if the data setting is terminated (S70 3).

The operation of the power zoom, shutter 203 and iris 108 according to the embodiment of the present invention is performed in the lens 100 by the method described above .

The power zoom according to a preferred embodiment of the present invention, and the operation of the iris (108) and shutter (203) are performed by the method as above in the lens (100).

As described above, according to the digital photographing device 1 according to the present invention, according to the digital photographing device 1 according to the present invention, if there is a request to start a release operation while performing a power zoom operation, Zooming is determined among the performance of the power zooming according to the case to control the power zoom operation more stably by determining whether to stop the power zoom operation, stopping acceptance and rejection of the power according to the power possible. ave consumption of the power zoom operation. where the case h becomes the start request of the release motion, and the power consumption of the power zooming and the power zooming is more steadily controlled.

[Normal power zoom operation 2]

[The general power zooming 2]

16 is a tie showing a driving method of a general power zooming operation. Figure 16 is a timing diagram the driving method of the general power zooming is shown. In case of fig. 16, it i Ming Dao. In the case of FIG . 16 , in the digital photographing device 1, the release s the timing diagram illustrating the control of the iris control of the power zoom and aperture 108 during operations other than the iris operation (108) and power zoom as to the As a timing diagram for digital photography, it is shown for device (1) among the operation except the release mot when power consumption power consumption of power zoom operation is small. of the power zo oming is small it confronts and it shows. ion and in case the

Referring to FIG. 16 , the S1 signal is applied by the user's manipulation (mt1), and then the power zooming operation is initiated by the user's manipulation of the power zoom ring (mt2). When the power zoom operation is started, variable focus correction for correcting a change in focus position according to the movement of the zoom lens 102 starts.

Referring to Figure 16, the S1 signal is applied with the operation of the user (mt1) and subsequently the powe r zoom ring is concocted by the user and the power zo oming is disclosed (mt2). When the power zooming is di sclosed, according to the movement of the zoom lens (102), the driving of the variable focus compensation a mending the change of the focal point is started.

And, in response to the change of focal length by power zoom operation, Len And it copes with the change of the focal distance by

The driving of the diaphragm 108 for correcting the change in the effective F-value of the lens starts (mt3 to mt5).

the power zooming and the driving of the iris (108) for amending the change of the validity F number of the le ns is started (mt3~mt5).

When the user's power zoom operation is finished, the power zoom operation is stopped (mt6), and final variable focus correction corresponding to the stop position of the zoom lens 102 is performed (mt7).

It is the power zooming *** (mt6) if the power zoom manipulation of the user is completed and the final vari able focus compensation corresponding to the stop pos ition of the zoom lens (102) is achieved (mt7).

[Power zoom operation 2-1 according to an embodiment of the present invention]

[The power zooming 2-1 according to a preferred embodiment of the present invention]

17 is a timing diagram illustrating a method of driving a power zoom operation according to another embodiment of the present invention. In the case of FIG. 17 , the case where the power consumption of the power zoom operation is large is shown.

Figure 17 is a timing diagram showing the driving method of the power zooming according to the dissimila r embodiment of the invention. In case of fig. 17, in ca se the power consumption of the power zooming is gre at it confronts and it shows.

Referring to FIG . 17 , as in FIG. 16 , the S1 signal is applied by the user's manipulation (mt1), and then the power zooming operation is initiated by the user's manipulation of the power zoom ring (mt2). When the power zoom operation is started, variable focus correction for correcting a change in focus position according to the movement of the zoom lens 102 starts.

Referring to Figure 17, the S1 signal is applied like fig. 16 with the operation of the user (mt1) and subsequen tly the power zoom ring is concocted by the user and t he power zooming is disclosed (mt2). When the power zooming is disclosed, according to the movement of th e zoom lens (102), the driving of the variable focus co mpensation amending the change of the focal point is s tarted.

The focal length is changed by the power zoom operation, and thus the effective F value of the lens is changed. In this embodiment, the iris 108 is not driven immediately following the start of the power zoom operation.

The focal distance changes with the power zooming and accordingly the validity F number of the lens chang es. The iris (108) is not driven in the present preferred embodiment subsequently directly in the initiation of th e power zooming.

When the user's power zoom operation is finished, the power zoom operation is stopped (mt6), and final variable focus correction corresponding to the stop position of the zoom lens 102 is performed (mt7).

It is the power zooming *** (mt6) if the power zoom manipulation of the user is completed and the final vari able focus compensation corresponding to the stop pos ition of the zoom lens (102) is achieved (mt7).

In this embodiment , the aperture 108 is driven to compensate for the change in the effective F value after the final variable focus correction is completed (m t7 to mt8).

In the present preferred embodiment, so that the change of the validity F number be amended after the performance of the final variable focus compensation is completed, the iris (108) is operated (mt7~mt8).

[Power zoom operation 2-2 according to an embodiment of the present invention]

[The power zooming 2-2 according to a preferred embodiment of the present invention]

18 is a timing diagram showing a driving method of a power zoom operation according to another embodiment of the present invention . 18 , a small method of the power zooming according to the dissimilar embodiment of the invention . In case of fig. 18, in ca Indicates the case where the specific power is and it shows. large. se the power consumption of the power zooming is gre at it confronts

Referring to FIG . 18 , as in FIG. 16 , the S1 signal is applied by the user's manipulation (mt1), and then the power zoom ring is manipulated by the user to start the power zoom operation (mt2). When the power zoom operation is started, variable focus correction for correcting a change in focus position according to the movement of the zoom lens 102 starts.

Referring to Figure 18, the S1 signal is applied like fig. 16 with the operation of the user (mt1) and subsequen tly the power zoom ring is concocted by the user and t he power zooming is disclosed (mt2). When the power zooming is disclosed, according to the movement of th e zoom lens (102), the driving of the variable focus co mpensation amending the change of the focal point is s tarted.

In this embodiment, the change in the effective F value of the lens by the power zoom operation is performed in the middle of the power zoom operation, and during the power zoom operation

In the present preferred embodiment, the change of the validity F number of the lens by the power zooming

to ban Accordingly, the power zoom operation is stopped at the time points of mt3, mt4, and mt5 when the driving of the diaphragm 108 starts.

is performed in the halfway of the power zooming and t he power zooming is forbidden in meantime. Therefore, in the mt3, starting the driving of the iris (108) the mt 4, and the mt5 point of time, the power zooming is sto pped.

After the power zoom operation is stopped, driving of the diaphragm 108 is started, thereby changing the effective F value. When the correction of the effective F value is completed, the power zoom operation is started again.

After the power zooming is stopped the driving of the iris (108) is started and the validity F number is therefo re diversified. If the correction of validity F number is t erminated

. the power zooming is again disclosed.

When the user's power zoom operation is finished, the power zoom operation is stopped (mt6), and final variable focus correction corresponding to the stop position of the zoom lens 102 is performed (mt7).

If the power zoom manipulation of the user is completed , it is the power zooming *** (mt6) and the final variable focus compensation corresponding to the stop position of the zoom lens (102) is achieved (mt7).

As described above, in the digital photographing apparatus 1 according to the present embodiments, when there is a request to start driving the aperture 102 while performing the power zoom operation, whether or not the power zoom operation is stopped according to the power consumption of the power zoom operation By determining, it is possible to more stably control the power zoom operation.

As described above, in the digital photographing device (1) according to these embodiments, stopping accepta nce and rejection of the power zooming are determined among the performance of the power zooming accordin g to the case where the case have the driving initiatio n demand of the iris (102), and the power consumption of the power zooming and the power zooming is more s teadily controlled.

Values such as time used in describing the embodiments of the present invention are used illustratively for description, and are not limited thereto, and may be changed in various ways.

The value of the time etc which is used in illustrating the embodiments of the invention is illustratively used f or the description. It is not restricted and the variously will be changeable.

The present invention has been described with reference to the embodiments shown in the drawings, but For your reference, it was the embodiment in which the illustrative only, and the common knowledge in the art is the invention was illustrated in drawing illustrated but this i If you are a true person, you will understand that various modifications and equivalent other embodiments are possible from this s illustrative it is nothing but and if it experiences and i. Therefore, the true technology t grows up under the technical field of the present invention, it will understand the scope of protection that it changes and the equal and dissimilar embodimen should be determined by the technical spirit of the appended claims. t is possible to be from this various. Therefore, it should be determined with the technical mapping of the pat ent claim in which the extent of technical protection c alming oneself down of the invention is attached.

Brief description of the drawing

Brief explanation of the drawing Figure 1 is drawing showing

1 is a diagram showing a digital photographing apparatus according to an embodiment of the present invention.

the digital photographing device according to the embodiment of the invention.

FIG . 2 is a diagram illustrating a camera control unit of the digital photographing apparatus according to FIG. 1 .

Figure 2 is drawing showing the camera control part of the digital photographing device according to fig. 1.

3 is a diagram explaining an AF operation in the contrast AF method.

Figure 3 is a drawing illustrating the AF operation in the contrast AF mode.

4 is a timing diagram illustrating a general AF method.

Figure 4 is a timing diagram the general AF method is s hown.

5 is a timing diagram illustrating a driving method of a general power zoom operation.

Figure 5 is a timing diagram the driving method of the g eneral power zooming is shown.

6 is a timing diagram illustrating a method of driving a power zoom operation according to an embodiment of the present invention.

Figure 6 is a timing diagram showing the driving method of the power zooming according to the embodiment of the invention.

7 is a timing diagram illustrating a method of driving a power zoom operation according to another embodiment of the present invention.

Figure 7 is a timing diagram showing the driving method of the power zooming according to the dissimilar embod Figures 8 to 10 are digital imaging chapters according to an embodiment of the invention. It is a flow chart showing the control method of the body part of the tooth.

11 is a diagram showing lens data according to an embodiment of the present invention.

12A to 15 are flowcharts illustrating a method of controlling a lens of a digital photographing device according to an embodiment of the present invention.

16 is a timing diagram illustrating a driving method of a general power zoom operation.

zoom operation according to another embodiment of the present invention.

18 is a timing diagram illustrating a method of driving a power zoom operation according to another embodiment of the present invention.

Figures 8 through 10 are the flowchart showing the co ntrol method of the main body part of the digital photo graphing device according to the embodiment of the in vention.

Figure 11 is drawing showing lens data according to th e embodiment of the invention.

Figures 12a through 15 are the flowchart showing the control method of the lens of the digital photographing device according to the embodiment of the invention. 17 is a timing diagram illustrating a method of driving a power

Figure 16 is a timing diagram the driving method of the general power zooming is shown.

Figure 17 is a timing diagram showing the driving metho d of the power zooming according to the dissimilar emb odiment of the invention.

Figure 18 is a timing diagram showing the driving metho d of the power zooming according to the dissimilar emb odiment of the invention.