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Title of Invention

imaging device

Title of Invention

Photographing apparatus

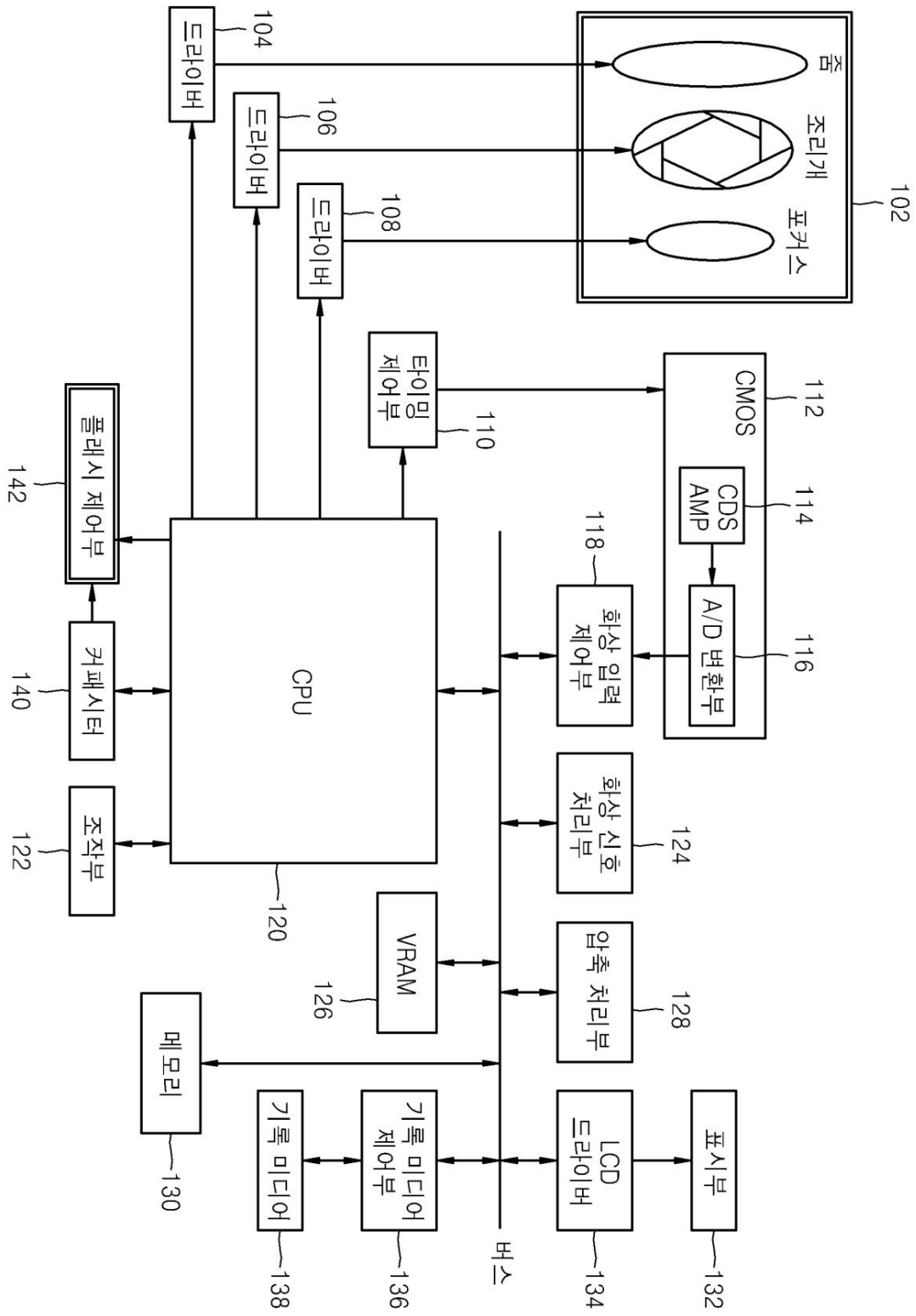
summary

Abstract

It can have the time difference of the radiation which allows the time difference between preliminary flashing and main flashing to be variable, and the invention looks at with the preliminary flashing as an image capable of detecting an appropriate amount of exposure during preliminary flashing. t It is an object to provide an apparatus, and to achieve this object, he variable and it is done detecting the exposure a, the present invention is arranged in by the purpose providing the photographing apparatus for flashing a photoelectric conversion element that accumulates a matrix form and Follow mount which is appropriate in the preliminary element nd in order that this purpose is accomplished the invendifferent accumulated charges, and the photoelectric conversion to the position of a row or column discloses the photographing tion to sell the accumulated charges with a time difference according to main exposure, all of the photoelectric conversion ranged apparatus for being ar poisoning stored charge readout means, prior means resetting the stored charges of the ring elements at the in the form of the matrix and including the photoelectric conversion same time, and oelectric conversion element accumulating the stored c reset harge according to the exposure, the accumulation imaging device including a timing variable unit is ele ctric charge decipherment means of reading the stored An disclosed. charge to the time difference according to the position of the row of the photoelectric conversion element or heat, the reset means of all at once performing the reset of the stored charge of all photoelectric conversion el ements before the main exposure, and the reset timing variable means of diversifying the timing performing the reset of the stored charge about the synchronization p ulse corresponding to the read time of the stored charg

It is.

Representative drawing



scope of claim

Scope of Claims

Claim **1:**

Claim 1:

A photoelectric conversion element arranged in a matrix form and accumulating stored charge according to exposure; stored charge reading means for reading the stored charge with a time difference according to the position of a row or column of the photoelectric conversion element; resetting means for simultaneously resetting the stored charges of the photoelectric conversion elements; and resetting the stored charge

The photographing apparatus including the photoelectric conversion element, the accumulation ele ctric charge decipherment means of reading the stored charge to the time difference according to the position of the row of the photoelectric conversion element or h

and reset timing variable means capable of changing the timing for performing the stored charge with respect to a synchronizing pulse corresponding to a reading time of the stored charge.

eat, the reset means of all at once performing the rese t of the stored charge of all photoelectric conversion el ements, and the reset timing variable means of diversif ying the timing performing the reset of the stored char ge about the synchronization pulse corresponding to th e read time of the stored charge, and the photoelectric conversion element is arranged in the form of the matri x ; and accumulates the stored charge according to th e exposure.

Claim **2:**

Claim 2:

As for claim 1, the photographing apparatus in which it further includes this light emitting means of doing it loo; A first preliminary toward ks in the main exposure to the subject, the preliminary light emitting means for performing preliminary light emission preliminary exposure condition before the main exposure; flashing means of the preliminary flashing before the ma under a first exposure before the main gun, in which the pre-emission light is Exposure means; A second pre-exposure unit s of performing the first pre--exposure mean non- exposure condition . a second pre- added for the first example in exposure to the subject, the first pre exposure condition, the second pre- exposure d pre -exposure exposure means for performing ; and phase exposure to the first pre- the second pre-exposure with the second pre-exposure condition, means of performing the second pre-exposure condition by comparing amount A condition determining unit may further include a posure the second pre-ex main exposure to determine the light emission may control the pre-exposure condition before the main about the first pre-exposure condition to the se, and the reset unit simultaneously reset the imaging device, and the main exposure and the preliminary exposure before the preliminary exposure. and the decision on a condition me. ans of comparing the first pre-exposure second pre-exposure and determining the luminous output in the above-mentioned radiation looked; and the reset means all at once performs the reset of the stored charge of all photoelectric conversion elements before the main exposure total pre-exposure.

Claim **3:**

Claim 3:

The imaging device according to claim 2 , wherein preliminary exposure is performed on only some rows or columns of the photoelectric conversion elements during the first preliminary exposure and the second preliminary exposure.

As for claim 2, the photographing apparatus for performing the pre-exposure in the first pre-exposure a nd the second pre-exposure in the some row or the he at of the photoelectric conversion element.

Claim **4:**

Claim 4:

The imaging device according to claim 1, wherein the reset timing variable means changes the timing according to an operation of an external operating member.

As for claim 1, the photographing apparatus which the reset timing variable means diversifies timing according to the operation of the external operation member.

Claim **5:**

Claim 5:

The imaging device of claim 1 , wherein the reset timing varying unit changes the timing to “As for claim 1, the photographing apparatus which the” according to photographing conditions. reset timing variable means diversifies timing according to the photographing condition.

Claim **6:**

Claim 6:

2. The imaging device according to claim 1, wherein the reset timing variable means sets the reset timing of the stored charge immediately before the synchronizing pulse.

As for claim 1, the photographing apparatus which the reset timing variable means sets up the timing of the re set of the stored charge as the synchronization pulse j ust before.

Claim **7:**

Claim 7:

The imaging device according to claim 1, wherein the photoelectric conversion element does not have a memory section for storing the stored charge.

As for claim 1, the photographing apparatus which does not have with the memory unit in which the photo electric conversion element stores the stored charge.

Claim **8:**

Claim 8:

The shutter according to claim 1, which is disposed closer to the subject than the photoelectric conversion element, is opened during the main exposure, and is closed after a predetermined time elapses after resetting the stored charge before the main exposure. An imaging device further comprising:

As for claim 1, the photographing apparatus it is arranged in the subject than the photoelectric conversi on element ; it is done by the open state in the main e xposure ; the reset of the stored charge is performed b efore the main exposure ; and further including the shu tter which it is done by the closed state after the fixed time passage.

Claim **9:**

Claim 9:

The imaging device according to claim 1, further comprising diaphragm driving means for driving a diaphragm for adjusting an amount of exposure to the photoelectric conversion element before the main exposure.

As for claim 1, the photographing apparatus further including the iris driving means of operating the iris con trolling the exposure amount to the photoelectric conv ersion element before the main exposure.

Claim 10:

Claim 10:

The imaging device according to claim 1 , further comprising additional charging means for performing additional charging for the main light emission before the main exposure.

As for claim 1, the photographing apparatus further including additional recharge means of charging before the main exposure with the addition for the above-men tioned radiation looked.

background art

Background Art

The present invention relates to an imaging device, and more particularly, to an imaging device capable of varying the time difference between preliminary light emission and main light emission.

The present invention relates to the photographing apparatus and the photographing apparatus for having the time difference of the radiation which it more speci fically looks with the preliminary flashing as the variabl

It is.

An imaging device including an imaging element such as a photoelectric conversion element is a device that includes a lens, a diaphragm, a shutter, or the like, and reads, as an electrical signal, electric charge generated in response to light impinging on the imaging surface of the imaging element, and records an image.

The photographing apparatus equipped with the image pickup device including the photoelectric conversion el ement etc is the apparatus for reading and recording t he image as the electric signal the electric charge whic h includes the lens or the iris, and the shutter etc and i n that way it corresponds to the light contacting to th e field of view of the image pickup device and is genera ted.

When photographing using an image capture device under environmental conditions such as at night or indoors, when the amount of light required to obtain an appropriate image is insufficient, a flash provided in the image capture device emits light to increase the amount of light, and then the image is taken.

In the environment condition of the night time or the room lamp, in case the light quantity for obtaining the i mage which is appropriate when taking a picture using the photographing apparatus is insufficient after the fla sh equipped in the photographing apparatus is radiated and the light quantity is increased it takes a photograp h.

By the way, in order to reduce the manufacturing cost or miniaturization of the imaging device, but while the need luminous output of the flash is not installed in the imaging device, the subject is actually measured in the case which does not set up the sensor For the first time when the main shooting is recorded on the medium, the flash is required for the first time for the dimming in the miniaturization of th While measuring the amount of light, adjusting photographing photographing apparatus for the manufacture cost reduction or the the focus or exposure at the same time as the main shooting e apparatus, and this photography recor is impossible. ding the subject in the recording medium in fact for the first time the looks at the focus or the exposure photo graphy is impossible to simultaneously control with the photography which.

Therefore, before the main flash emission at the time of the main shooting, the pre-flash of the flash is performed in advance to measure the required amount of emission. Then, the main shooting is performed after finishing the adjustment of the focus and exposure before the main shooting. In this regard, in Japanese Patent Laid-Open No. 2000-196951 ,

Therefore, the preliminary flashing of this radiation before previously flash of the flash in this photography is done and the need luminous output is measured. And it photographs before this photography it looks at after

in connection with the this, the ex during preliminary flash before flash, posure amount is detected in the preliminary flash . A technology capable of setting up the optical exposure by this radiation in this photography or the white balance, and the focus zone of the lens is di closed. it expires the modulation of the focus or the exposure. In JP2000-196951 A exposure amount is detected, and optimal exposure, white balance, and lens focus setting the location of flashing is disclosed. this radiation total and the technology

On the other hand, if the pre-flashes are performed before the main flashes, if the time difference between the pre-flashes and the main flashes is long, the person in the subject may mistake the pre-flashes for the main flashes. There was a problem that an appropriate image could not be obtained because the image was wound up.

In the meantime, it had the case of mistaking to the radiation in which the individual of the subject looked a t the preliminary flashing before the radiation looking at the preliminary flashing if the time difference of the radi ation looked with the preliminary flashing drew in case and the case had the problem that the individual who was the subject which looked after the preliminary flas hing moved or it could not obtain the image which was appropriate because it breathed last.

In addition, in order to accurately detect the exposure amount during pre-light emission before the main shot, the exposure amount measured during pre-light emission should not be saturated, and the exposure period during pre-light emission measurement or the emission period during light emission should be appropriately controlled. Should be. However, in spite of the adjustment of the exposure period during pre-flashes, such as when shooting with a flash in a bright room, the measured exposure amount during pre-flashes is saturated and it is often impossible to detect an appropriate exposure amount. Therefore, in those cases, there was a problem that the required amount of light emission at the time of main light emission could not be obtained.

Moreover, the exposure amount which is measured in the preliminary flashing in order to detect the exact ex posure amount in the preliminary flashing of this photog raphy total, should not be saturated and the light emis sion period in the exposure period in the preliminary flas hing measurement or radiation has to be appropriately controlled. But in the bright indoor, the case of detecti ng the exposure amount in which the exposure amount measured in spite of the modulation of the exposure pe riod in the preliminary flashing in the preliminary flashing was saturated using the flash in case the takes a phot ograph of like back and which was appropriate was oft en generated. Therefore the case had the problem that it could not obtain the necessary luminous output in th e radiation looked as to the cases.

content of invention

Summary of Invention

Effects of the Invention

Effects of the Invention

According to the present invention, according to the invention, it has the effect that the time difference of the radiation looked with the effect of detecting an appropriate amount of exposure during preliminary light emission can be made variably according to the invention. there is Preliminary flashing can be changeably done and the exposure amount which is appropriate in the preliminary flashing can be detected.

Although the present invention has been described with reference to the embodiments shown in the drawings, this is only exemplary, and those skilled in the art will understand that various modifications and equivalent other embodiments are possible therefrom. Therefore, the true technical protection scope of the present invention should be determined by the technical spirit of the appended claims.

For your reference, it was the embodiment in which the invention was illustrated in drawing illustrated but this is illustrative it is nothing but and if it grows up, it will understand that it changes and the equal other embodiment is possible to be from this various.

Therefore, it should be determined with the technical mapping of the patent claim in which the extent of technical protection calming oneself down of the invention is attached.

technical challenge

Technical Task

A main object of the present invention is to provide an imaging device capable of varying the time difference between preliminary light emission and main light emission and detecting an appropriate amount of exposure during preliminary light emission.

The purpose of being principal of the invention can have the time difference of the radiation looked with th e preliminary flashing as the variable and it is to provid e the photographing apparatus for detecting the expos ure amount which is appropriate in the preliminary flashi ng.

Structure & Operation of the Invention

The invention discloses a photoelectric conversion element arranged in a matrix form and accumulating axial charges according to exposure, and for being arranged in the form of the matrix and including rows or rows of the photoelectric conversion element ng the photoelectric conversion element accumulating accumulating charge reading means for reading the accumulated charge with a time difference according to the position of the column, and all the photoelectric conversion elements the stored charge according to the exposure, the accumulating A reset means for simultaneously resetting the stored charge, and a electric charge decipherment means of readin before main exposure charge to the time difference according to a synchronization pulse timing for resetting the stored charge according to the axis g the stored corresponding to a reading time of the stored charge An imaging device including a reset timing, the position of the row of the photoelectric ming the reset of the stored charge of all conversion element or heat, the reset means of all at once perfor. photoelectric conversion elements before the main exposure, and the reset timing variable means of diversifying the timing pe forming the reset of the stored charge about the sync hronization pulse corresponding to the read time of the stored charge.

Here, the reset timing variable unit may be controlled by a CPU. Here, the reset timing variable means can be controlled to CPU.

Here, this light emitting means of doing the photographing apparatus looks in the main exposure to the subject as viewed emitting means for emitting light to the subject before the main toward the subject during the main exposure, and the main light and a first example minorary flashing before the main exposure to exposure , the preliminary flashing means of the preli preliminary light emission, preliminary exposure under non -exposure conditions before the the subjec first preliminary exposure number t for performing the first and the pre-exposure obtained by adding the pre-exposure to the main exposure , the first pre-exposure means of performing the first stage, exposure to perform the second pre-exposure under the second first pre-exposure condition before the main exposure to the first pre- exposure means of exposure means, and comparing the first pre- pre- exposure condition. A second pre-exposure condition, the second pre- about the first pr to determine the amount of light emitted at the exposure with the second pre -exposure performing the second pre-exposure determination e-exposure condition to the second pre-exposure time of the main light emission It further includes a main exposure condition conversion elements before the main exposure and adding the condition means, wherein the reset means determines all of the photoelectric The resetting of the stored preliminary flashing, and the main exposure before the preliminary exposure. charge can be done simultaneously ure decision on a condition means of comparing the firs. t pre-exposure and the second pre-exposure and deter mining the luminous output in the above-mentioned radiation looked further are included and the reset means a ll at once can perform the reset of the stored charge of all photoelectric conversion elements before the main exposure total pre-exposure.

Here, the exposure condition determining unit and the resetting unit may be controlled by a CPU.

Here, the exposure condition decision means and reset means can be controlled to CPU.

Here, during the first preliminary exposure and the second preliminary exposure, preliminary exposure may be performed only on some rows or columns of the photoelectric conversion element.

Here, in the some row of the photoelectric conversion element in the first pre-exposure and the second pre-e xposure, or heat, the pre-exposure can be performed.

Here, the reset timing variable means may change the timing according to the manipulation of an external operating member. Here, the external operating member includes, for example, a member for remote operation, a member installed on the outer surface of the main body of the imaging device, and the like. With the above configuration, the timing of resetting can be varied by manipulating an external operating member.

Here, according to the operation of the external operation member, the reset timing variable means can diversify timing. Here, the member, and the installation money absence on the exterior of the photographing a pparatus main body etc are included. The member the external operation member remotely operates for exam ple. The external operation member is manipulated with the configuration. In that way the timing of the reset c an be varied.

Here, the reset timing variable unit may change the timing according to photographing conditions. Here, the shooting conditions include, for example, imaging device setting conditions such as shooting environmental conditions, exposure conditions, or sensitivity conditions, and driving conditions of the imaging device, such as diaphragm driving or additional charging.

Here, according to the photographing condition, the reset timing variable means can diversify timing. Here, t he photographing condition comprises for example, the photographing environment condition, the set condition of the photographing apparatus including the exposure condition or the condition etc. it winds, the iris driving, or the driving condition of the photographing apparatus including additional charge etc.

Here, the reset timing varying unit may set the reset timing of the stored charge immediately before the synchronization pulse.

Here, the reset timing variable means can set up the timing of the reset of the stored charge as the synchro nization pulse just before.

Here, the photoelectric conversion element may not have a memory unit for storing the stored charge.

Here, the photoelectric conversion element does not have with the memory unit storing the stored charge.

Here, the imaging device includes a shutter that is disposed closer to the subject than the photoelectric conversion element, is opened during the main exposure, and is closed after a predetermined time elapses after resetting the stored charge before the main exposure. can be further provided.

Here, the photographing apparatus may further include the shutter which it is arranged than the photoelectric conversion element in the subject and it is done by the open state in the main exposure and after the reset of the stored charge is performed before the main exposur e it does after the fixed time passage to the closed sta te.

Here, the imaging device may further include a diaphragm driving means for driving a diaphragm for adjusting an amount of exposure to the photoelectric conversion element before the main exposure.

Here, the photographing apparatus may further include the iris driving means of operating the iris controlling th e exposure amount to the photoelectric conversion ele ment before the main exposure.

Here, the imaging device may further include additional charging means for additional charging for the main light emission before the main exposure.

Here, the photographing apparatus may further include additional recharge means of charging before the main exposure with the addition for the above-mentioned ra diation looked.

Hereinafter, the present invention will be described in detail with reference to the embodiments shown in the accompanying drawings. The invention is particularly this specification and drawings, the same reference numerals are given to components having substantially the same functional configuration. w. As to this duplicate description is omitted.

illustrated with reference to the embodiment shown in the drawing attached belo. In specification and drawing, by giving the s ame reference numbers about the element having the s, redundant explanations are omitted. same function configuration the

First, with reference to FIG. 1, the configuration of an imaging device according to an embodiment of the present invention will be described.

First, referring to Figure 1, it illustrates for the configuration of the photographing apparatus about th e embodiment of the invention.

1 is a block diagram showing the configuration of an imaging device according to an embodiment of the present invention.

Figure 1 is a block diagram showing the configuration of the photographing apparatus about the embodiment of the invention.

As shown in Fig. 1, the imaging device according to the present embodiment has an external unit 110, with the CMOS (complementary metal oxide driver 104, 106, 108) and (complementary metal oxide semiconducting related double sampling circuit pling) / amplifier) (114), with the A / D converting portio double sampling/amplifier) input control unit 118, CPU (central processin he CPU (central processing unit) ulation part 122, with the image signal processing par VRAM (video random memory) unit 128, memory 130, display unit 132, LCD (liquid cry (126), with the unit 136, h the memory 130, with the display unit 132, with t recording It is display) driver 134, with the reg 142 . ister media control part (136), with the the operation of the optical system (102) are included and it is formed. As to the light from the outside through.

As shown in Figure 1, the optical system (102), and the driver (104), (106), with (108) , with the timing of the optical system 102 passing light from con Copper trol timing controller (xide semiconductor) 112, with the CDS / AMP (the co (110)), CMOS (correlated double sam ctor) 112), CDS / AMP (correlated double sampling circuit (correlated 114, A/D conversion unit n 116, with the image input control part 118, with t 116, image 120, with the manip g unit) 120, manipulation unit 122, image signal processing unit 124, access memory) 126, compression processing t (124), with the VRAM (video random access compression processing part (128), wit stal display) driver 134, recording media control composed of a media 138, a capacitor, a capacitor 140, a flash controller he LCD (liquid crystal recording media (138), capacitor, with the condenser (140), flash control part (142) controlling optical sy stem (102), the photographing apparatus about this e mbodiment passes the

The optical system 102 includes a lens, a zoom mechanism, an aperture mechanism, and a focus mechanism. images the subject through a lens in a CMOS (11 device, the iris device and focus tool. The optical system 102) images the subject in the CMOS (112) through 2). The driver 104 controls the zoom mechanism of the optical system 102

The optical system (102) has the lens, the zooming.

driving, the driver 106 drives the diaphragm mechanism of the optical system 102 , and the driver 108 drives the focus mechanism of the optical system 102 .

h the lens. The driver (104) may drive the zooming devi ce of the optical system (102) and also drive the driver (108) is the focus tool of the optical system (102) the driver (106) operates the iris device of the optical syst em (102).

The timing controller 110 controls the exposure period of each pixel constituting the CMOS 112 and controls the reading of charge. The CMOS 112 is composed of elements capable of photoelectric conversion, and each element generates an electrical signal in response to light received.

The interpretation control of the control of the exposure period of each pixel in which the timing contr ol unit (110) configures the CMOS (112) or the electric charge is performed. It is formed the minor in which the CMOS (112) the photoelectric conversion is possible an d the electric signal is produced in response to the ligh t which each device light receives.

The CDS/AMP 114 removes low-frequency noise included in the electrical signal obtained from the CMOS 112 and amplifies the electrical signal to an arbitrary level. The A/D conversion unit 116 converts an analog electrical signal into a digital signal.

With removing the flicker noise included in the electric signal in which the CDS / AMP (114) is obtained from th e CMOS (112) the electric signal is amplified to the arbi trary level. The A/D converting portion (116) converts the electric signal of the analog into the digital signal.

The image input controller 118 receives operation commands from the CPU 120 and controls the operations of the CMOS 112, the CDS/AMP 114 and the A/D converter 116 related to image input.

The image input control part (118) controls the CMOS (112) about the input of the image, and the CDS / AMP (114) the operating instruction from the CPU (120) is r eceived and the operation of the A/D converting portio n (116).

The control unit 122 is composed of a power switch, a mode changer, and a shutter button, and is used by the user to set the shutter speed or ISO sensitivity.

So that the manipulation part (122) consists of power switch, and the mode exchanging measure and shutter button etc and the user set the shutter speed or the I SO sensitivity, it is used.

The VRAM 126 is a memory for displaying images, and is composed of a memory having a plurality of channels so that display images can be written and displayed on the display unit 132 at the same time.

As the VRAM (126) is the memory for the image display, it is composed of the memory of having multipl e channels in order to the simultaneously practice the display to the inscribe of the display image and display unit (132).

The compression processing unit 128 converts the input image data into compressed data in a compression format such as a JPEG compression format or an LZW compression format.

The compression processing part (128) converts input image data into data compacted to the compressed for mat including JPEG compressed format or the LZW com pressed format etc.

The memory 130 is composed of a semiconductor storage element such as SDRAM (synchronous DRAM), and stores high-speed shutter images taken in time-division photography. Also, the operation program of the CPU 120 is stored in the memory 130 .

The memory (130) consists of the semiconductor memory device including the SDRAM (synchronous DRA M) etc. and of the high speed shutter image taken a pi cture with time sharing is preserved for example. Moreo ver, in the memory (130), the operation program of the CPU (120) is preserved.

The image signal processing unit 124 synthesizes images, and the synthesized image is stored in the memory 130 .

The image signal processing part (124) synthesizes the image and the synthesized image is preserved in the m emory (130).

The display unit 132 is composed of display means such as an LCD , and an image read from the VRAM The display unit 132 comprises the display means 126 is displayed. The LCD driver 134 includes tables including LCD etc. And the read-out image is indicated in the VRAM (126). The liquid crystal display driver operates the display unit (132) and the output of the display unit (132) (13) drives the display unit 132 to control the output of the display unit 132. 4) is controlled .

The recording medium control unit 136 controls the writing of image data to the recording medium 138 or the reading of image data or setting information recorded in the recording medium 138 .

The register media control part (136) controls the read including image data or the set up information etc. rec orded in the inscribe of image data to the recording me dia (138) or the recording media (138).

The recording medium 138 is composed of, for example, an optical recording medium, a magneto-optical disc, a magnetic disc, a semiconductor storage medium, and the like, and records captured image data. The recording medium 138 may be configured to be detachable from the imaging device.

The recording media (138) records image data consisting of the optical recording medium, magnetoopt ical disc, magnetic disc, the semiconductor memory me dia etc and are photographed for example. It may be a cceptable that the recording media (138) is attachably and detachably formed from the photographing apparat

us.

The capacitor 140 temporarily stores power in order to secure the necessary power capacity in the flash light. radiation of the flash etc., the capacitor (140) provisio nally accumulates electricity.

The flash controller 142 controls light emission of the flash, and in particular, controls light emission operation linked to simultaneous resetting of an imaging device or opening/closing operation of a mechanical shutter.

The kana key reset of the image pickup device radiation is controlled or the light emitting operation op erating with open and close operation of the mechanic al shutter in the flash control (142) is the flash are con trolled.

Next, with reference to FIG. 2, the operational flow of the imaging device involving preliminary light emission and main light emission will be described. 2 is a flowchart showing an imaging process according to the present embodiment.

Next, it illustrates for the operation flow of the photographing apparatus for accompanying the radiatio n looked with reference to fig. 2 with the preliminary fla shing. Figure 2 is a flowchart showing the imaging proc ess about this embodiment.

In the imaging device according to the present embodiment, when the shutter release is pressed, the imaging process is started (step S100). embodiment, the imaging process is disclosed since the shutter release is pressed down (step S100).

First of all, it is determined whether or not the flash light emission is required at the time of the main shooting (step S102).

First, it determines whether it is not whether it is the photography in which the radiation of the flash is nece ssary in this photography (step S102).

If flash photography is unnecessary, take the main picture as it is. That is, exposure is started without flash emission, and input of image signals is started. At this time, the imaging device accompanies driving of the mechanical shutter (step S160).

In case the flash photographing is unnecessary it does it like that looks. That is, the flash is not radiated and the exposure is disclosed and the input of the picture s ignal is disclosed. Then, the photographing apparatus a ccompanies the driving of the mechanical shutter (step S160).

On the other hand, if flash photography is required, a shutter speed for pre-light emission is determined according to a photographing environment (step S104).

In the meantime, if necessary, the flash photographing determines the shutter speed in the preliminary flashing according to the photographing environment (step S10 4).

And, the shutter speed for the determined preliminary light emission is instructed to the imaging device And the shutter speed for the determined preliminary (step S106). Next, flashing is indicated to the image pickup device (step S 106) of only the normal light component. Next, it exposes to the inputs an exposed image signal for iminary flashing only the normal light shutter speed for the prel exposure at the shutter speed for preflashes, and component and th (step S108). e exposed picture signal is injected (step S108).

Moreover, thereafter, the exposure accompanying the exposure accompanying the preliminary light emission at the shutter speed for the preliminary light emission and inputting an image signal (step S110). And, the two furnaces preliminary flashing, and the picture signal are injected by the shutter only the normal light component obtained from the input pattern and the speed for the preliminary flashing (step light #183# Based on the data of data of the case including the preliminary flash component Ha S110). And the amount of reflected light obtained with the preliminary flashing is produced (step S112). obtained from 2 exposure input patterns and prelimina ry based on data of th e case of including data of the normal light component flashing flash component (step S112).

Next, from the calculated amount of reflected light, the actual amount of light emission at the time of actual imaging is determined (step S114). Also, the shutter speed at the time of the main light emission is determined (step S116). Then, the determined shutter speed for light emission is instructed to the imaging device (step S118).

Next, this luminous output in the photography looked from the calculated amount of reflected light is determi ned moreover, the shutter speed in this radiation is det ermined (step S (114)) (step S116). And the shutter s

Then, the main shooting accompanied by light emission of the flash is performed. That is, exposure is performed accompanying the main light emission of the flash, and an image signal is input. At this time, the imaging device accompanies driving of the mechanical shutter (step S12 0).

peed for determined this radiation is indicated to the im age pickup device (step S118).

And it takes a picture it accompanies the radiation of the flash. That is, this radiation of the flash is accompa nied and it exposes and the picture signal is injected. T hen, the photographing apparatus accompanies the dri ving of the mechanical shutter (step S120).

After steps S120 and S160, image processing is performed on the read image signal, and image data is written to storage (step S140).

The image processing is made after the step S120 and step S160 from the read-out picture signal and image d ata are recorded in the storage (step S140).

A series of imaging processes are thus ended, and the imaging device returns to the next imaging standby state (step S160).

A series of imaging process is terminated to over and the photographing apparatus returns to the next photo graphy standby state (step S160).

Next, referring to FIG. 3, an exposure control method using a general imaging device will be described. Fig . 3 is an explanatory diagram showing the exposure timing of the rolling shutter when a high-speed shutter is selected. The vertical axis represents the position of each line in the vertical direction of the imaging device, and the horizontal axis represents the elapsed time. Fig . 3 also shows both the vertical transmission period and the flashing period.

Next, referring to Figure 3, it illustrates for the exposure control method by the general photographing apparatus. Figure 3 is an illustrative view showing the exposure timing of the rolling shutter when choosing th e high speed shutter. The longitudinal axis shows each line position of the vertical direction of the image picku p device and the lateral axis shows the elapsed time. I n fig. 3, the vertical transfer period and flash radiation period are moreover altogether indicated.

In the rolling shutter, exposure of each line of the image pickup device starts from the top line (TOP row) of each line (TS) and sequentially starts to the bottom line (LAST row) (LS). Then, after a certain exposure period has elapsed from the start of exposure, the electric charge accumulated in each pixel of the imaging device is read out as an image signal. Reading of the image signal is started from the top line (TO P row) (TE) and sequentially from the bottom line (LAST row) (LE). The exposure period of each line is the time difference between the exposure start time and the read start time.

In the rolling shutter, the exposure of each line of the image pickup device is disclosed from the line (TOP ro w) of the upper end among each line and it is successi vely disclosed (TS) (LS). And after the arbitrary expos ure period passes from the exposure initiation it is read as the picture signal which is accumulated in each pixel of the image pickup device transmitting. The read of th e picture signal is disclosed in the line (the TOP row) of the upper end and it is successively disclosed (TE) (L E). The exposure period of each line is the time differen ce between the exposure start time and the starting re ad time.

In FIG. 3, a parallelogram having TS, TE, LE, and LS as vertices exposure sta time axis (horizontal axis) The point where the line parallel to and shown in the ti indicates the exposure start time or end time of each line. me the TOP row is from the TS point to the TE point, and the LAST ossed. Parallel.

In fig. 3, the range surrounded by the parallelogram the TS, TE, LE, LS to the vertex shows the photo exposure, the action of the image pickup device and the the side of the parallelogram intersect rt time or the finish time of each line is axis (lateral axis) the side of the parallelogram is cr For example, the exposure of For example, to the exposure of the LA row is from the LS point to the LE point.

ST row is the LE point from the LS point the exposure of the TOP row in the TS point the TE point.

The vertical transfer period (VD) is the time indicated between vertical sync pulses. synchronization pulse to the immediately following vertical synchronization his The flash emission period g pulse after the work is expressed in 1VD from tical synchronizing pulse. The light emission period of t image pickup in which short as 1 millisec in comparison with 1 device, as shown in FIG. 3, the device in which the subject light can receive the charge including the flash the image pickup device exposed to light at the overlapping portion may flash can acc. umulate the electric charge including the flash component in the is, the electric ch arge in which the exposed image pickup device includes the flash component in the

It is the time when the vertical transfer period (VD) is indicated between the vertical synchronizing pulse. In t In this specification, the period from one vertical specification, the period to the vertical synchronization pulse, is expressed as 1VD . one ver is, for example, 1 millisecond, which is quite short compared to 1VD . and Pisa the body is affected by the flash and can receive the reflected light he flash is quite exposure period and the flash emitter VD for example. And as shown in Figure 3, the ckup component can be accumulated in the overlapping part between the image pi. That is, accumulate charge including flash component reflection light under the influence of the exposure period and the part in which the flash radiation period is the same. That flash component can be accumulated in the part o verlapping.

Since the exposure period of the rolling shutter when the high-speed shutter is selected is short, the line affected by the flash is, for example, only the center of the screen, as shown in FIG. At this time, the exposure period of the TOP row or LAST row is excluded from the flash emission period. Therefore, the flash component is not included in the image signal read from the TOP line or the LAST line. Therefore, it is necessary to lengthen the exposure period in order to expose the flash-irradiated subject in all lines of the imaging device and to include the flash component in all lines.

Because the exposure period of the rolling shutter when choosing the high speed shutter is short as show n in Figure 3, the line of the flash receiving is for exam ple, the central part of the screen. Then, the exposure period of the TOP row or the LAST row is excluded fro m the light emission period of the flash. Therefore, in t he TOP row or the picture signal read in the LAST row, the flash component is not contained. Therefore, all lin es of the image pickup device expose the subject in wh ich the flash is irradiated and the exposure period is dra wn in order to include the flash component in all lines.

Next, referring to FIG. 4, a rolling shutter when a slow shutter is selected will be described. Fig . 4 is an explanatory diagram showing the exposure timing of the rolling shutter when a slow shutter is selected. As shown in FIG. 3, the vertical axis represents the position of each line in the vertical direction of the imaging device, and the horizontal axis represents the elapsed time. 4 shows both the vertical transmission period and the flash emission period.

Next, it illustrates for the rolling shutter when choosing the low speed shutter with reference to fig. 4. Figure 4 is an illustrative view showing the exposure timing of th e rolling shutter when choosing the low speed shutter.

As shown in Figure 3, the longitudinal axis shows each l ine position of the vertical direction of the image picku p device and the lateral axis shows the elapsed time. M oreover, in fig. 4, the vertical transfer period and flash radiation period are altogether indicated.

In FIG. 4, the exposure period is longer than in FIG. 3 because a slow shutter speed is selected . As shown in Fig . 4, the flash emission period and the exposure period of each line of the imaging device overlap in all lines. Accordingly, it is possible to expose a subject to which the flash is irradiated in all lines of the imaging device. However, when a slow shutter speed is selected and the exposure period is lengthened, it is easily affected by hand shake and the like, and blur occurs in the image, making it impossible to obtain a clear image. In addition, in an environmental condition with strong light such as outside light, the imaging device is saturated, making it impossible to obtain an appropriate image.

In fig. 4, the exposure period is long in comparison with fig. 3 because the low speed shutter was chosen. As s hown in Figure 4, the exposure period of each line of th e flash radiation period and image pickup device are ov erlapped in all lines. Therefore, in all lines of the image pickup device, the subject in which the flash is irradiat ed can be exposed. But in case the low speed shutter i s chosen and the exposure period is drawn it is easy to be affected of the vibration of hand etc. and the shaki ng is generated in the image and the clear image canno t be obtained. Moreover, in the environment condition t hat it has the strongly light including the external light etc, the image in which the image pickup device is satu rated and which is appropriate cannot be obtained.

Furthermore, if the calculation area for dimming is limited to the center of the screen, the selection of shutter speeds can be expanded even in the case of performing a rolling shutter. However, since the calculation domain cannot be extremely narrowed, the shutter speed that can be selected in the high-speed direction is limited.

Besides, if the computing region for dimming is limited to the screen center the selection of the shutter spe ed can be expanded even in case of performing the rolli ng shutter. But the shutter speed of choosing the high speed because it makes narrow is the computing region the restrictive.

Next, with reference to FIG. 5 , exposure timing using a mechanical shutter to start exposure by simultaneous resetting will be described. 5 is an explanatory diagram showing exposure timing when exposure is started after reset and a mechanical shutter is used in combination .

Next, it illustrates for the exposure timing which discloses the exposure with reference to fig. 5 with the same time reset using the mechanical shutter jointly. Fi gure 5 is an illustrative view showing the exposure timi ng when disclosing the exposure after the reset and usi ng the mechanical shutter jointly.

As shown in FIG. 5, the charge reset of all lines from the TOP row to the LAST row of the imaging device is performed simultaneously with the vertical synchronizing pulse. Then, exposure of each line of the imaging device is simultaneously started simultaneously with resetting.

As shown in Figure 5, in the TOP row of the image pickup device, the reset of the electric charge of all lin es to the LAST row are simultaneously performed with the vertical synchronizing pulse. And the exposure of e ach line of the image pickup device is simultaneously all at once disclosed with the reset.

Next, after the lapse of a predetermined exposure period, reading of image signals is started from the TOP row of the imaging device at the same time as the vertical synchronizing pulse immediately after the start of exposure, and reading is started sequentially up to the LAST row. The exposure period of each line of the imaging device is the reset timing of the charge of the imaging device.

Next, disclosed are the read of the picture signal after the predetermined exposure expiration of period, is the vertical synchronizing pulse after the exposure initiatio n work and the read it is simultaneously disclosed in th

until the start time of reading the image signal. Therefore, each line of the imaging device has a difference in the exposure period in the vertical direction. That is, as shown in Fig. 5 , the exposure period of the TOP row is, for example, 1VD , and the exposure period of the LAST row is, for example, 2VD, and an exposure difference of 1VD occurs between the TOP row and the LAST row . Accordingly, the exposure amount of each line increases as one goes from the TOP line to the LAS T line. Furthermore, the reset timing of the charge of all lines of the imaging device may be controlled by the timing control unit 110 or may be controlled by providing a timing generator function to the inside of the CMOS 112.

e TOP row of the image pickup device. To the exposure period, of each line of the image pickup device is the st arting read time of the picture signal from the reset tim e of the electric charge of the image pickup device. Th erefore, in each line of the image pickup device is the v ertical direction, the difference is generated in the exp osure period. That is, as shown in Figure 5, the exposu re period of the TOP row for example is 1VD and the ex posure period of the LAST row is for example, 2VD and the exposure difference of 1VD is generated in the TOP row and LAST row. Therefore, in the TOP row, the exp osure amount of each line increases due to the line of t he LAST row according to the feeling. Furthermore, it may be acceptable that it is good even if the reset tim e of the electric charge of all line of the image pickup d evices are controlled to the timing control unit (110) a nd the timing generator function is given inside the CM OS (112) and it is controlled.

In the mechanical shutter is the open state, the incident light to by being closed from the open state. Exposure is terminated initiated by simultaneous an be compulsively all at once blocked mechanical s make the exposure period of all lines of the imaging period of a da. As a result, it is possible to speed up flash ll while including the flash component on all lines, and the range with the same time res flash et, and the mechanical shutter jointly. embodiment, the flash component is included and the range of the flash speed can be heightened while the memory unit for make up the screen are electronically shuttered simultaneously, cut off the shutter, so-called global shutters are not adopted. Moreover, in the present preferred em, the area of the light receiving part can be increased because there is no need to make a it is made of the photodiode part who light r. eceives the light and the mode, which electrically all at once cuts the shutter so-called, the g lobal shutter is not employed through the pixel whole c

each line of the ruler can be forcibly blocked simultaneously when the mechanical shutter is blocked. Therefore, when exposure is since the closed reset, the state is. The exposure is terminated if the device the same. Hutter is blocked. So, it makes the exposure lines of the image pickup device identical by using the flash component of selectable shutter speeds, in the case of disclosing the exposure Consequently, it can be widened to i. In addition, in this the shutt, consisting of a photodiode unit for receiving light n all lines, accumulating light reception within one screen, and 1 All the pixels that so er speed of choosing can broaden the range that is not a way to shortened than the flash radiation period with the high speed direction. memory part for accumulating charge by the light receiving body, within 1 screen and the memory unit accumulating the light accepting oprising 1 screen. Therefore, because the memory uni t accumulating the electric charge by the light accepti ng does not have to be made the area of the light receiving part can be broadened.

Next, with reference to FIG. 6, the exposure timing of preliminary light emission and main light emission will be described.

Next, referring to Figure 6, it illustrates for the exposure timing of the radiation looked with the prelimi nary flashing.

Figure 6 is an illustrative view showing the exposure timing in the direction of the imaging device, or the minor flashing time. The elapsed time. 6 shows the vertical motion ne position of the device, and flash emission period of the device and the lateral synchronizing pulse, the re set of the electric charge of the image pickup device, and the flash radiation period are indicated altogether.

photography which reaches with the preli brightness. The vertical axis represents the position of each line in the vertical longitudinal axis shows each li, and the horizontal axis represents vertical direction of the image pickup pulse, charge reset of the imaging axis shows the elapsed time. Mor is indicated. ever, in fig. 6, the vertical

Exposures (12), (14), (16), and (18) shown in Fig. 6 represent exposure operations of the imaging device. As in FIG . 5, the reset of the charge of all lines from the TOP row to the LAST row of the image pickup device is performed simultaneously with the vertical synchronizing pulse, and each exposure (12), (14), (16), (18) of the image pickup device

The exposure (12), (14), (16), (18) shown in fig. 6 shows the photo exposure action of the image pickup d evice. In the TOP row of the image pickup device like fi g. 5, the reset of the electric charge of all line to the L

In this case, exposure to each line is simultaneously started simultaneously with charge resetting. Next, after the lapse of a predetermined exposure period, image signal reading is started from the TOP row of the imaging device at the same time as the vertical synchronizing pulse immediately after the start of exposure, and reading is started sequentially from each line up to the LAST row. The exposure period of each line of the imaging element is from the reset timing of the electric charge of the imaging element to the start timing of image signal reading.

AST rows are simultaneously performed with the vertic al synchronizing pulse and the exposure is simultaneous ly all at once disclosed in each exposure (12), (14), (1 6), (18) of the image pickup device with the reset of t he electric charge in each line. Next, disclosed are the read of the picture signal after the predetermined expo sure expiration of period, is the vertical synchronizing p ulse after the exposure initiation work and the read it is simultaneously disclosed in the TOP row of the image pi ckup device. To the exposure period, of each line of th e image pickup device is the starting read time of the p icture signal from the reset time of the electric charge of the image pickup device.

The exposure amount which the exposure (12) is the exposure in the picture capture without the flash opera (12) includes the exposure amount of the normal light component. e amount of flash component. tion and is obtained in the exposure (12) is the contained. the normal light component in which the fl ash component is not

Exposure 14 is exposure at the time of capturing an image accompanied by a flash operation as a pre-light emission in a pre-light emission period, as shown in FIG. 6 . The exposure amount obtained in the exposure 14 includes the normal light component and the pre-emission flash component in a mixed and added state.

In as shown in Figure 6, the preliminary flashing period, the exposure (14) is the exposure in the picture captur e accompanying the flash operation as the preliminary f lashing. As to the exposure amount obtained in the exp osure (14), in the normal light component and the stat e where the preliminary flashing flash component is add ed after mixing are included.

In exposure 16, an exposure operation without a flash is performed in the same manner as in exposure 12.

In the exposure (16), the photo exposure action without the flash is performed identically with the expo sure (12).

As shown in FIG. 6, the exposure 18 is the exposure at the time of main shooting accompanied by a flash operation as main light emission during the main light emission period.

The exposure (18) as shown in Figure 6 is the exposure in this photography accompanying the flash operation a s the radiation looked in the light emission period looke d at.

In the exposure (14) in which the preliminary flashing is performed, the mechanical shutter is not accompanied. I never do that. different for each line of the image element. For example, in Therefore, each line of the picture element the exposure is to 1VD . For example, in the TOP row and period exposure the TOP line and the LAST line, e amount is changed, corresponding exposure 14, the exposure difference of the suitable perio difference occurs. However, the exposure LAST row obtained in exposure 12 and d is generated in 1VD. But because the amount, is the difference between the exposure amount obtained in difference in the exposure amount of each line is negligible. e exposure amou nt obtained in the exposure (14) is used to produce the the exposure amount obtained in the exp preliminary flashing flash component drunkenly the dif ferential with osure (12), the difference of the exposure amount of e ach line can be ignored.

In addition, since the mechanical shutter generates a sound of operation of the shutter, the sound may be annoying. In addition, since the next exposure cannot be started from the closed state of the mechanical shutter until it is completely opened, there is a problem in that time lag occurs in the operation of the imaging device. Therefore, if a mechanical shutter is used during pre-flashes, the shutter sound may be confused with the shutter sound for main shooting, and the image pickup device cannot promptly enter the main shooting mode after pre-flashes. Therefore, the mechanical shutter is not used in case of pre-light emission during image capture before the main shooting.

Moreover, occasionally, as to the mechanical shutter, sound is harsh because the operation the negative prin ciple in nature of the shutter is generated. Moreover, t here is a problem that in operation time lag of the phot ographing apparatus is generated because the next ex posure cannot be disclosed until it becomes the open s tate which is perfect in the closed state of the mechan ical shutter. Therefore, it has the concern which confo unds with the shutter sound of the photography which the shutter sound looks if it uses the mechanical shutt er in the preliminary flashing and it cannot perform to t he photographic Mode which the photographing appara tus immediately looks after the preliminary flashing. The refore, the mechanical shutter is not used in case of th e preliminary flashing in the picture capture of this phot ography total.

This luminous output of the flash in this photography is calculated based on the exposure amount obtained by exposure (12) and exposure (14). Pre-flash flash properties calculated based on the exposure (12) and the exposure e amount obtained to the exposure obtained fr data value of the image signal read by exposure 14 (14). By being quie, t the preliminary flashing flash component is without flash operation The value of the picture signal read with at the time of preliminary flashing, om the data read by exposure 12 in the preliminary flashing corresponding to the corresponding the e data value of the image signal is obtained by writing xposure (14) between the evaluation value of the preliminary flash image and pixel. This amount of light emission is calculated from the difference (12) without the flash operation. It is calculated from d The the target data value of the picture signal read with the exposure level. amount, is performed during the exposure period 16, for setting of the control value, such as the setting of the second exposure the evaluation value e of the back up flash image and target example, about 2VD, as shown in FIG. 6 ifference of this luminous output, is level. As show. n in Figure 6, the control value setting including the es tablishment of this luminous output calculation, and the main exposure amount etc. based on the luminous output is performed between the period of the exposure (1 6), for example, about 2VD.

In addition, exposure 18 with a mechanical shutter is performed during this photographing. Therefore, the exposure period at the time of this photographing is from when the charge of the imaging device is reset all at once until the mechanical shutter is closed. In the pre-light emission and main shooting operations shown in FIG . 12 , a light emission time lag A occurs between the pre-light emission period and the main light emission period, and the light emission time lag A is, for example, about 4VD .

And the exposure (18) accompanying the mechanical shutter is performed in this photography. Therefore, th e exposure period in the photography looked at is the b oyish face to the time in which for the mechanical shut ter, the closed state is from the kana key reset of the electric charge of the image pickup device. In the oper ation of the photography looked at with the preliminary flashing shown in fig. 12, the radiation time lag (A) is g enerated between the light emission period looked at w ith the preliminary flashing period and the radiation time lag (A) is for example, about 4VD.

Next, referring to FIG. 7 , a case in which the pre-emission timing is delayed by degrees compared to the case of FIG. 6 will be described. Fig . 7 is an explanatory diagram showing exposure timing during pre-light emission and during main shooting. Since FIG . 7 is the same as FIG. 6 except for the preliminary light emission period, a detailed description thereof is omitted.

Next, referring to Figure 7, in case of delaying the preliminary flashing time than fig. 6 it confronts and it il lustrates. Figure 7 is an illustrative view showing the ex posure timing in the photography which reaches with t he preliminary flashing time. The detailed explanation o mits the preliminary flashing time because it is identical with fig. 6.

In the exposure timing of FIG. 6 described above , preliminary light emission is performed in the first half of the vertical transfer period VD immediately after the start of the exposure 14 . On the other hand, in the exposure timing shown in Fig. 7, preliminary light emission is performed at the end of the vertical transmission period (VD) . As a result, the light emission time lag (B) occurring between the preliminary light emission period and the main light emission period is, for example, about 3 VD. In the case of performing the preliminary light emission shown in FIG. 7, the time lag can be shortened by about 1 VD compared to the light emission time lag (A) of FIG .

In the above-described exposure timing of fig. 6, the preliminary flashing is performed in the initiation work fu ture generations of the exposure (14), and the front pa rt of the vertical transfer period (VD). In the meantime, in the exposure timing shown in fig. 7, the preliminary fl ashing is performed in the final part of the vertical tran sfer period (VD). Consequently, the radiation time lag (B) generated between the light emission period looked at with the preliminary flashing period is for example, a bout 3VD. It compares with the radiation time lag (A) o f fig. 6 and the case of doing the preliminary flashing s hown in fig. 7 can shorten the time lag as the period of about 1VD.

Incidentally, in the exposure 14 with preliminary light emission shown in Figs. 6 and 7, the exposure period in the TOP row is 1VD, and the exposure period in the LAST row is 2VD. In a low-luminance scene such as a dark room or at night, it is common for the shutter speed to be longer than 1VD in order to obtain an appropriate amount of exposure . Therefore, the exposure (14) performed in the exposure period is not saturated in a low luminance scene. On the other hand, if pre-emission is performed under environmental conditions such as a bright room, the exposure 14 may become saturated because the pre-emission flash component is added to the normal light component. Therefore, there is a need for a technique in which the exposure 14 is not saturated even when pre-emission is performed in a higher luminance environment than in a low luminance scene.

But the exposure (14) accompanying the preliminary flashing shown in fig. 6, and fig. 7 the exposure period at the TOP row is 1VD and the exposure period at the LAST row is 2VD. In the low brightness scene of the in door or the dark night light, in order to obtain the prop er exposure amount, it is general that the shutter spee d is lengthened than 1VD. Therefore, the exposure (14) performed in the exposure period is not saturated in th e low brightness scene. In the meantime, in the enviro nment condition of the bright room lamp, the preliminar y flashing flash component is the preliminary flashing ad ded to the lower-side, and the normal light component.

Therefore it has the concern in which the exposure (1 4) is saturated. So, although the preliminary flashing is

more except the low brightness scene in the environme nt condition of the high luminance the technology in w hich the exposure (14) is not saturated is needed.

Next, referring to FIG. 8, a case where the charge reset timing of the imaging device is moved to the end of the vertical transfer period (VD) will be described. Fig. 8 is an explanatory diagram showing exposure timings during preliminary light emission and during main shooting.

Next, referring to Figure 8, in case of moving the reset time of the electric charge of the image pickup device to the final part of the vertical transfer period (VD) it c onfronts and it illustrates. Figure 8 is an illustrative vie w showing the exposure timing in the photography whic h reaches with the preliminary flashing time.

The exposures 22, 24, and 26 shown in FIG. 8 are shown in FIGS. 6 and 8 show in figures 6 an. Charges on all lines from the TOP row to the row of the image pickup is performed simultaneously with the vertical charge of all line to th, reset is performed at the end of the vertical performed with the ver and FIG. 7, the exposures 22, 24, and 26 of vertica set, each line starts simultaneously. Next, a predetermined l of image signals immediately after the start of exposure s performed de starts at the TOP line of the image pickup device simultaneously simultaneously all at once disclo Read sequentially from each line until reset in each line. The exposure period of each line of Nex is from the disclosed are the read of the picture signal after the start of reading synchronizing pulse after the exposure initiation works and the read it is simultaneously disclosed in the TO P row of the image pickup device. To the exposure peri od, of each line of the image pickup device is the starting read time of the picture signal from the reset time of the electric charge of the image pickup device.

In the cases of FIG . 7 and FIG . 8, the pre-light emission period and main emission In case of the case of fig. 7 and fig. 8, the emission time lag (B) between the radiation periods is the same. In addition, each time lag (B) of the imaging device looked at is identical with the preliminary each line of the image pickup device is the same in that the exposure flashing period between the light emission period. And the exposure of hand, in the case shown in FIG. 8, the charge reset timing is moved of the line starts simultaneously with the reset of the charge. On the other transfer period (VD) , and exposure (22), (2 rge. In In the meantime, to the end of the vertical ntical to be disclosed with the reset of the electric cha imaging device of (26) is et time of the electric charge is moved to the in case it shows in fig. 8 the res 4), the exposure period of each line of the way, by moving the time of the vertical transfer period (VD) and it last part exposure (12), (14), (16) shorter than the exposure period. In this (24), and the exposure period of e exposure start time is delayed. shortens the reset timing of the charge of the imaging device, the exposure (22), period of each line. As a result, pre-emission is performed on with the ach line of the image pickup device of (26) in comparis can shorten the exposure of exposure in exposure 24 is not saturated, e.g. e exposure period exposure (12), shown in fig. Even in the case of 7 (14), and th, the amount be obtained while non-emitting. eset time of the electric charge of the of (16). In this way, by moving the r, an appropriate amount of exposure can be postponed and the exposure period of each line can be image pickup de vice the exposure period of onset of the exposure (24) can reduced. Consequently, in the environment condition of the bright room lamp, while the exposure amou nt at the exposure (24) is not saturated and the prelimi nary flashing is the proper exposure amount can be obt ained from the case of the preliminary flashing.

Furthermore, in the above, the reset timing of the charge of the imaging device is vertically transferred. (1VD) . The reset timing is a time when a pre-emission period can be sufficiently secured so that all lines of the image pickup device include vertical transfer od (1VD). The reset time is the time which can be Furthermore, the reset time secure the preliminary flashing period in 24 is not saturated e the flash component by the preliminary flashing in ore, as to the reset time, while

Furthermore, in the above case, the reset time of the electric charge of the image pickup device one example is shown at the end of the period a flash component due to pre-emission was shown in the final part of the enough, and it is the time before the next vertical synchronization pulse. in order to include, but is not limited to the above example, when the exposure all lines of the image pickup device, and it is the You can change the setting with time of to. tal than the next vertical synchronizing pulse. Furtherm nots being restricted for r example, it can change the setting into the time when the exposure (24) is not saturated.

Next, with reference to FIG. 9, preliminary light is emitted in the high speed read-out mode. Next, in the high speed read-out mode with reference

Exposure in the case of is described. Fig. 9 is an explanatory diagram showing exposure during pre-emission in high-speed reading mode and standard reading mode.

to fig. 9, the preliminary flashing is illustrated for the ex posure of NULL. Figure 9 is an illustrative view showing the exposure in the preliminary flashing of the high spe ed read-out mode and standard read-out mode.

In the standard reading mode shown at the bottom of Fig. 9, the length of the vertical transfer period (VD) is 1VD, and the exposure 24 is the same as the case shown in Fig. 8 described above. Exposure 24 resets the charge on the imaging device at the end of the vertical transfer period. 8 , the length of the vertical transfer period (VD) is 1VD , and the reading start time, end time, and period length of each line of the image pickup device are the same. Reading of the image signal is 1 VD from the TOP line to the LAST line.

The length of the vertical transfer period (VD) the standard read-out mode of fig. 9 which it beneath sho ws is 1VD and the exposure (24) is identical with the c ase of showing in fig. above-described 8. In the final p art of the vertical transfer period, the exposure (24) re sets the electric charge of the image pickup device. M oreover, the read drawing of the picture signal at the i mage pickup device is identical with 8 and the starting read time of each line of the point, in which the length of the vertical transfer period (VD) is 1VD or the image pickup device, the ending time, and the length of the p eriod are the same. In the TOP row, the read of the pic ture signal is 1VD to the LAST row.

On the other hand, the high-speed reading mode shown above in Fig. 9 is a mode in which the period required for reading is shortened by reducing the amount of data read from the imaging device.

In the meantime, it is the mode which reduces the period required for the read by reducing the data slot which the high speed read-out mode shown in the upp er part of fig. 9 reads from the image pickup device.

In high-speed read mode, one vertical sync pulse to the next pulse, compared to standard read mode, e.g. period to the next vertical synthe image signal th the standard read-out mode into for example, 1/3 a, And in comparison with to the LA ST row ÿ which is not all lines in the device is determined to the line of 1/3 as in the case shown in FIG. 8 , not vertical sync pulse In the TOP row of the picture el, we are moving to mode, the exposure operation in the high-speed reading mode, as shown charge of the image pickup device is moved to t. he final part of the of the vertical synchronizing pulse. Consequently, as shown in Figure 9, shows in the exposure (3 4).

In the high speed read-out mode, the vertical transfer period to the sync chronizing pulse is shorte ned in one vertical synchronizing pulse in comparison wi 1/3 , and is referred to as 1/3VD . And the line for reading from the TOP line to the LAST line of the picture element nd it is called 1/3VD. standard read-ou. In addition, in this mode, the charge reset timing of the imaging immediately after the t mode and the line deciphering the picture signal is red the end of the vertical sync pulse. As a result, Fig. 9 ement. Moreover, in this in the reset time of the el, becomes as shown in the exposure (34) ectric vertical synchronizing pulse like the case of showing in fig. 8 of being not work after the photo exposure action of the high speed read-out mode becomes as it

In this way, by shifting the reset timing of the charge of the imaging and the exposure period of each line exposure 34 can be postponed by the vertical transfer period me of the electric charge of the image pickup the vertical transfer period is shortened as th, the exposure amount of the synchronizing the amount deciphering the picture signal the exposure environment with high luminance e high speed read-out mode and by device can be decreased. Since Th is not saturated, an appropriate is high, although it takes a picture by the mode the preliminary

device, the exposure period of the onset of the light 34 can be delayed, Moving the reset ti can be shortened. In addition, as a high-speed reading mode, device a nd the exposure period of each line can be reduced. By shortening M and processing to reduce the amount of image signal reading, oreover, imaging device can be reduced. Therefore, in the case of photographing by amd during the daytime accompanied by a flash operation in an outdoor doing reduces exposure even with pre-flashes (34) amount of the image pickup amount of exposure can be obtained. erefore, in the outdoor in which the brightness flashing is for the day accompanying the flash operatio n to the sink the exposure (34) is not saturated and the proper exposure amount can be obtained.

Next, referring to FIG. 10, an exposure mode in which exposure is started by simultaneous reset (hereinafter referred to as simultaneous reset mode) and an exposure mode using a rolling shutter (hereinafter referred to as rolling shutter mode) are compared. 10 is an explanatory view showing exposure timings in simultaneous reset mode and rolling shutter mode, and a screen of an imaging device for capturing a subject.

Next, referring to Figure 10, the exposure mode (it is hereinafter called the rolling shutter mode) by the expo sure mode (it is hereinafter called the same time reset mode), disclosing the exposure with the same time rese t and rolling shutter is compared. Figure 10 is an illustra tive view showing the screen of the exposure timing of the same time reset mode and rolling shutter mode and the photographing apparatus for catching the subject.

The same time reset mode shown in fig. 10 resets the charge of the imaging device . 10 performs at the end of the vertical transfer period, and also shows a case in which pre-emission is performed immediately before the reset of the electric charge of the image pickup de vice in the final part of the vertical transfer period and sync pulse. . In addition, a case of g in the just before of the vertical synchronizing pulse i in which preliminary the rolling the case of performing moreover, the preliminary flashin shutter mode shows shown when the imaging device captures a subject. And the rolling shutter mode flashing is performed at the same time as the simultaneous reset mode. The screen 50 is an area for evaluating the reflected light from the subject at the same time as the sam shows the case below zero indicates the entire screen, and the evaluation target area 52 indicates photographing apparatus takes a picture of the subject and the estimated-targets light time. e time reset mode. The screen (50) indicates the entity screen in which the flashing. domain (52) indicates the domain evaluating the reflection light from the subject in the preliminary

The main light emission amount of the flash at the time of main shooting is determined by evaluating the light reflected from the subject at the time of preliminary flashing. In this algorithm for determining the light emission amount, the periphery of the screen has a lower weight in the evaluation. Therefore, the evaluation target region 52 is located in the center of the screen 50, and the vertical and horizontal length of the evaluation target region 52 is 1/2 of the vertical and horizontal length of the screen. As shown in FIG. 10, the exposure of each line of the image pickup device corresponding to the evaluation target region 52 of the screen 50 is between the two upper and lower dotted lines of the simultaneous reset mode exposure and the rolling shutter mode exposure, respectively. represented by the area in which Comparing the simultaneous reset mode and the rolling shutter mode for the exposure of the portion corresponding to the evaluation target region 52, it can be seen that the simultaneous reset mode reduces the amount of exposure. Therefore, compared to the rolling shutter mode, the simultaneous reset mode is less likely to saturate the exposure during pre-emission, and can be applied under various shooting conditions.

This luminous output of the flash in this photography evaluates the reflection light from the subject in the pr eliminary flashing and it is determined. In the ebone lum inous output decision algorithm, the peripheral unit of t he screen lowers the specific gravity of evaluation. Th erefore, the estimated-targets domain (52) is in the ce ntral part of the screen (50) and the length of length a nd breadth of the estimated-targets domain (52) are 1/2 of the length of length and breadth of the screen.

As shown in Figure 10, the exposure of each line of the image pickup device corresponding to the estimated-ta rgets domain (52) of the screen (50) is expressed as th e domain having between the dotted line of 2 of expos ure each top and bottom of the exposure of the same t ime reset mode and rolling shutter mode. If it compares about the exposure of the part corresponding to the es timated-targets domain (52) to the same time reset mo de and rolling shutter mode it can know that the expo sure amount of the same time reset mode side is decre ased. Therefore, the possibility that the exposure is sa turated is worse than in the preliminary flashing and th e same time reset mode side can apply in comparison w ith the rolling shutter mode under the some kinds photo graphing condition.

As described above, in the simultaneous reset mode, the exposure period of each line of the imaging device can be shortened by moving the reset timing of the charge of the image pickup device to the end of the vertical transfer period instead of synchronously with the vertical synchronizing pulse. . That is, by allowing the reset timing to be arbitrarily determined in the simultaneous reset mode, the possibility of saturation of exposure can be reduced compared to the rolling shutter mode, contributing to the improvement of the accuracy of dimming by pre-emission.

As described above, in the same time reset mode, by the reset time of the electric charge of the image picku p device nots being decided on to the vertical synchro nizing pulse and same time and moving the reset time i n the final part of the vertical transfer period the expos ure period of each line of the picture element can be re duced. That is, in the same time reset mode, even if it compares with the rolling shutter mode by arbitrarily de termining the reset time the possibility that the exposu re is saturated can be reduced and it can contribute to the accuracy improvement of the dimming by the prelim inary flashing.

Next, the exposure timing during this photographing will be described with reference to FIGS. 11A and 11B . 11A and 11B are explanatory diagrams showing exposure timing at the time of main shooting with a mechanical shutter. FIG. 11A shows a case in which the charge reset timing of the imaging device is moved to the latter half of the vertical transfer period, and FIG. 11B shows a case in which the reset timing is set simultaneously with the vertical transfer period.

Next, it illustrates for the exposure timing in the photography looked with reference to figures 11a and 1 1b. Figures 11a and 11b are an illustrative view showin g the exposure timing in this photography accompanyin g the mechanical shutter. Figure 11a shows in that cas e, the drawing 11b decides on the reset time to the ve rtical transfer period and same time it shows the case of moving the reset time of the electric charge of the i mage pickup device to the late of the vertical transfer period.

As shown in FIG. 11B, in this photographing, charge reset of the image pickup device is performed simultaneously with or immediately after the vertical synchronizing pulse, and exposure 18 is started on each line of the image pickup device simultaneously with the reset . lee

As shown in Figure 11b, disclosed are the reset of the electric charge of the image pickup device in this photo graphy is the vertical synchronizing pulse and the rese

By setting the set timing at the same time as or immediately after the vertical synchronizing pulse, the shutter time lag from when the photographer presses the shutter button until exposure actually starts can be shortened. However, even when the mechanical shutter is closed and light is blocked, dark noise is added to the image signal on the image pickup device until the image signal of the image pickup device is read. Therefore, the shorter the period from when the mechanical shutter is closed to the start of reading, the better.

t, simultaneously, the exposure (18) in each line of the image pickup device it is performed after the same time or the work. By deciding on the reset time to the vertic al synchronizing pulse and same time or the work after after the photographer presses the shutter button the shutter time lag to the time in which the exposure is di sclosed in fact can be shortened. But even in case the closed state is and the mechanical shutter is shielded t he boyish face to the time in which the picture signal o f the image pickup device is read the dark noise is adde d in the picture signal on the image pickup device. Ther efore, it is good to the period to the time in which the read is disclosed after for the mechanical shutter, the closed state is be short.

Therefore, by making the reset timing of the charge of the image pickup device variable, as shown in Figure So, by deciding on the reset time of the to the second half of the vertical transfer period The closed state is as shown electric charge of the image pickup device to the variable after 11a, when resetting in the closed state to the image e in the movement, and the mechanical shutter in Figure 11a, by moving the key fac, the period from when the mechanical shutter is image signal of the image pickup device orten the period to the read of the can sh signal readout can be shortened. Therefore, the dark noise added to the vertical transfer period. The image quality of Th image can be improved. By picture signal the re can be reduced, and the obtained image set time into the late of the picture quality of the image reducing the d, the shutter time lag becomes moving the reset timing to the second half of the vertical transfer period, erefore, the be obtained. to a high sensitivity setting p device and is obtained can be longer, but high ark noise added in the picture signal of the image picker quality image can reset time to the l ate of the vertical transfer period. However in case of improved. The shutter can be used when setting. time lag is lengthened by moving the definition image can be obtained it can setting up the photographing apparatus as the high-se nsitivity setting because the high use.

Next, exposure timing in the case of taking a main image after the diaphragm driving operation will be described with reference to FIGS. 12A and 12B . 12A and 12B are explanatory diagrams showing exposure timing at the time of main shooting . Fig. 12A shows a case where the charge reset timing of the imaging device is moved to the latter half of the vertical transfer period, and Fig. 12B shows a case where the reset timing is set simultaneously with the vertical synchronizing pulse.

Next, the photography looked with reference to figures 12a and 12b after the iris driving operation is illustrated for the exposure timing of NULL. Figures 12a and 12b ar e an illustrative view showing the exposure timing in thi s photography. Figure 12a shows in that case, the dra wing 12b decides on the reset time to the vertical sync hronizing pulse and same time it shows the case of mo ving the reset time of the electric charge of the image pickup device to the late of the vertical transfer perio d.

As shown in FIG. 12B, in the main shooting, there is an operation of shifting from the live view mode in which the imaging device holds the subject before exposure to the main shooting mode in which the subject is actually exposed . At this time, since there are cases in which the aperture position set in the live view mode needs to be set to the aperture position required for the shooting mode, a period of driving the aperture operation is required. Then, exposure is started after the diaphragm drive operation is completed.

As shown in Figure 12b, in this photography, it has the operation of performing to this photographic Mode whic h in fact exposes the subject in the live view mode in which the photographing apparatus catches the subjec t before the exposure. Then, in the iris location set up i n the live view mode, the case of to setting up as the necessary iris location is in this photographic Mode. Th erefore the iris driving operation period becomes neces sary. And this photography is disclosed after the iris dri ving operation is completed.

In the case of the example shown in FIG. 12B , the reset of the electric charge of the image pickup device in this photography in the case of is reset example, shown in the drawing 12b is the vertical s , and at the same time as simultaneously with or immediately after the vertical sync pulse , and the pulse and the reset, simultaneously, the e Therefore, the exposure 18 is resetting, exposure 18 is started for each line of the imaging device. Synchronizing image pickup device it i after completion of the aperture driving operation. started after waiting for the vertical synchronization pulse xposure 18 in each line of the same time or the work. Therefor reset cannot be performed within the same Therefore, the completion of the aperture driving operation and s performed after the the vertical synergism is disclosed after the vertical synergism is long, there vertical transfer period. In addition, if the period e, the exposure (18) is disclosed after driving operation completes. on is waited for. Therefore, the iris driving is a problem in that a time lag occurs when the release chronizing pulse after the iris identity. Moreover, there is a problem that the operation completion and reset cannot be performed within the vertical transfer period of the release time lag is generated if the pe riod from the iris driving operation completion to the ex

posure initiation draws.

Therefore, as shown in Figure 12a, the reset time is moved to the latter part of the vertical transfer period by making the reset time of the charge of the imaging device variable, as shown in Figure 12a, the reset time is dec iding on the reset time of the electric driving operation age pickup device to the variable. And in charge of the im. And, in the case of FIG. 12A, the diaphragm initiate exposure 38 without waiting for the vertical synchronizing case of the d rawing 12a, the vertical synchronizing pulse after the ir may operation is completed in the first half of the vertical transmission pulse after completion. Therefore, when the aperture driving vertical sync pulse and reset timing simultaneously, the exposure period, is driving operation completion can not be waited for a exposure can be shortened compared to the case of FIG. 12B (38) can be disclosed. Therefore, in c, the period until the start of as the iris driving operation is completed in the overall. of the vertical transfer period the vertical synchronizin g pulse and reset time are compared with case of the d rawing 12b appointed as the same time and the period to the exposure initiation can be reduced.

As described above, by making the reset timing of the charge of the image element variable and freely setting the reset timing under the control of the imaging device, the completion of the diaphragm driving operation and the reset can be performed within the same vertical transfer period, thereby shortening the release time lag. can

As described above, the reset time of the electric charge of the picture element is decided on to the vari able and by freely setting up the reset time with the c ontrol of the photographing apparatus the iris driving o peration completion and reset can be performed in the same vertical transfer within period and the release tim e lag can be shortened.

Next , additional charge for the radiation looked with exposure tie reference to figures 13a and 13b after the preliminary fl ming when additional charging for the light is required with reference to FIGS. 13A and 13B . explain about 13A and 13B illustrate exposure ashing for the exposure timing of this photog raphy of the need termination. Figures 13a and 13b are explanatory diagrams timing of the imaging device is moved to the latter part of the showing timing. 13A shows a case in which the charge reset vertical transfer period, an illustrative view showing the exposure timing in this photography. Figure 13a shows in that case, the the vertical synchr when the reset timing coincides with the drawi, and FIG. 13b shows ng 13b decides on the reset time to moving the vertical sync pulse. onizing pulse and same time it shows the case of reset time of the electric charge of the image pic kup device to the late of the vertical transfer period.

As shown in FIG. 13B , there are cases in which additional charging is required for main light emission, such as when the voltage suddenly drops after preliminary light emission in main shooting. At this time, an additional charging period is required until charges necessary for the main light emission are accumulated in the capacitor.

As shown in Figure 13b, occasionally, in this photography, it is after the preliminary flashing to go m ad back, and this radiation in case the voltage be sudd enly degraded and additional charge becomes necessar y. Then, it is to go mad this radiation and additional ch arging period to the time in which the necessary electri c charge is accumulated in the capacitor becomes nec essary.

And the exposure is disclosed after this photography additional charge completes. Disclosed are the reset of c. In the case of the of the image pickup device in this p is performed simultaneously example shown in FIG. 13B , the reset under the electric charge the case of photography, Simultaneously with the reset shown with or immediately after the vertical synchronization pulse, and in awing 13b is the vertical synchronizing pulse and the re- in the dr, exposure 18 is started on each line of the imaging device. simultaneously, the exposure 18 in each line of t after the exposure 18 begins after waiting for the vertical synchronizing pulse to set, charge and reset cannot be performed within the same vertical completion of additional charging. Therefore, completion of additional work. Therefore, if the period from the exposure (18) is transfer period. In addition, additional charge complete ime or the time lag occurred after the vertical synchronizing pulse after disclosing to the start of exposure is long, there is a problem that the release recharge complete addition. l recharge complete is waited for. Therefore, additional and reset cannot be performed within the same vertical transfer period. Moreover, there is a problem that in the sinker is the recharge complete, if the period to the exposure initiation is long, the relay se time lag is generated.

Therefore, by making the reset timing of the charge of the imaging device variable, the reset time transfer period by deciding on the reset time of the vertical transfer period as shown in Figure So, the reset time is moved to the late of the vertical 13a move ele And, in the case of FIG. 13A, the ctric charge of the image pickup device to the variable after the additional charge is completed. exposure 48 can be started without waiting for the vertical And in case of the drawing 13a, the vertical synchroniz The completed. synchronization pulse. ing pulse after additional recharge can not be

can shorten the period until the start of exposure compared to the case of FIG. 13B in which the vertical synchronizing pulse and the reset timing are simultaneous .

waited for and the exposure (48) can be disclosed. The refore, in case additional charge is finished in the overa ll of the vertical transfer period the vertical synchronizi ng pulse and reset time are compared with case of the drawing 13b appointed as the same time and the period to the exposure initiation can be reduced.

As described above, by making the reset timing of the charge of the image element variable and freely setting the reset timing under the control of the imaging device, additional charge completion and resetting can be performed within the same vertical transfer period, thereby shortening the release time lag. there is.

As described above, the reset time of the electric charge of the picture element is decided on to the vari able and the reset time is freely set up with the control of the photographing apparatus. In that way additional recharge complete and reset can be performed within t he same vertical transfer period and the release time la g can be shortened.

Brief description of the drawing

Brief explanation of the drawing Figure 1 is a block diagram

1 is a block diagram showing the configuration of an imaging device according to an embodiment of the present invention.

showing the configuration of the photographing apparatus about the embodiment of the invention.

2 is a flowchart showing an imaging process according to the present embodiment. Figure 2 is a flowchart showing the imaging process about this embodiment.

Fig. 3 is an explanatory diagram showing the exposure timing of the rolling shutter when a high-speed shutter is selected.

Figure 3 is an illustrative view showing the exposure timing of the rolling shutter when choosing the high spe ed shutter.

Fig. 4 is an explanatory diagram showing the exposure timing of the rolling shutter when a slow shutter speed is selected.

Figure 4 is an illustrative view showing the exposure timing of the rolling shutter when choosing the low spe ed shutter.

Fig . 5 is an explanatory diagram showing exposure timing when exposure is started after reset and a mechanical shutter is used in combination.

Figure 5 is an illustrative view showing the exposure timing when disclosing the exposure after the reset and using the mechanical shutter jointly.

6, 7 and 8 are explanatory diagrams showing exposure timing during pre-light emission and during main photographing.

Fig. 6. And figures 7 and 8 are an illustrative view showing the exposure timing in the photography which reaches with the preliminary flashing time.

Fig . 9 is an explanatory diagram showing exposure during pre-light emission in high-speed reading mode and standard reading mode.

Figure 9 is an illustrative view showing the exposure in the preliminary flashing of the high speed read-out mod e and standard read-out mode.

10 is an explanatory diagram showing exposure timings in simultaneous reset mode and rolling shutter mode, and a screen of an imaging device for capturing a subject.

Figure 10 is an illustrative view showing the screen of the exposure timing of the same time reset mode and r olling shutter mode and the photographing apparatus fo r catching the subject.

11A and 11B are diagrams showing exposure timing at the time of main shooting with a mechanical shutter.

Figures 11a and 11b is a drawing showing the exposure timing in this photography accompanying the mechanic al shutter.

12A and 12B are diagrams showing exposure timing at the time of main shooting after the diaphragm driving operation.

Figures 12a and 12b is a drawing showing the exposure timing in the photography looked after the iris driving o peration.

13A and 13B are diagrams showing exposure timing during main shooting when additional charging for main emission is required after preliminary emission.

Figures 13a and 13b is a drawing showing the exposure timing in this photography of the case in which addition al charge for the radiation looked after the preliminary f lashing is.

* Brief explanation of the symbols for the main parts of the drawing *

The simple description * of the denotation about the main part of * drawing.

12,14,16,18,22,24,26,28,34,38,48: exposure 50: screen 52: evaluation target area 102: optical system 104, 106, 108: driver 110: timing controller 112: CMOS

12,14,16,18,22,24,26,28,34,38,48: exposure. 50: screen 52: estimated-targets domain. 102: optical system 104, 106, 108: driver. 110: timing control unit 112: CMOS.

DESCRIPTION OF SYMBOLS 114: CDS/AMP 116: A/D conversion unit 118: image input control unit 120: CPU 122: operation unit 124: image signal processing unit

114: CDS/ AMP 116: a/D converting portion. 118: image input control part 120: CPU. 122: manipulation part 124: image signal processing part.

126: VRAM 128: compression processing unit 130: memory 132: display unit 134: LCD driver 136: recording media control unit

126: VRAM 128: compression processing part. 130: memory 132: display unit. 134: liquid crystal display driver 136: register media control part.

138: recording medium 140: capacitor
142: flash control unit

138: recording media 140: capacitor. 142:
flash control.