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IMAGE PRINT SUPPLYING MACHINE

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention relates to an image print supplier for printing and supplying image information of a photographed subject or combined information of the image information and various background information on a seal or postcard and more specifically to an image print supplier which is arranged so that a shooting point may be adjusted by allowing its camera to be turned and moved to be able to shoot the whole body of the object and to be able to be utilized not only as an amusement machine in places of amusement and game centers but also at any places where people gather such as hotels, wedding halls and department stores.

Description of the Related Art:

Hitherto, while various machines for printing and supplying image information of a subject or combined information of the image information and its background information have been developed, a camera is fixed at the position for shooting the face part of the subject in many of them, so that its shooting range has been limited from the face part to the chest at most and it could not shoot the whole body of the subject at all.

Further, when the subject is remarkably tall or short, there has been a trouble that the subject has to bend his knee in the former case or to stand on tiptoe or to mount on a stool in the latter case. Although a machine which is capable of shooting the whole body of a subject by using a camera comprising a wide angle lens has come to be also developed recently, it actually supplies a dull image peculiar to the wide angle lens and brings about only unnatural image prints in which the face part or the upper half of the body of the subject is greatly stressed even though its image information is corrected by software.

Still more, while an image printer disclosed in Japanese Patent Laid-Open No. Hei. 7-298123 exists as an a machine for shooting a subject by moving its camera and is capable of moving the camera in the vertical and horizontal (circumferential) directions, it cannot shoot the whole body of the subject at all and to supply its faithful image print because it moves the camera while the subject sits on a chair and it comprises no image information correcting means.

Accordingly, the present invention has been developed in view of the points described above and its object is to provide an image print supplier, at low cost, which is arranged to be able to freely adjust a shooting

point of a camera regardless of the height of a subject by giving rotational and moving functions to the camera, to shoot the whole body of the subject and to supply natural image prints as if the subject is shot from the front.

SUMMARY OF THE INVENTION

As means for solving the above-mentioned problems, according to a first aspect of the invention, there is proposed an image print supplier comprising at least a camera for shooting image information of a subject and a display for displaying the image information of the subject shot by the camera, wherein the camera is provided with tilting means for turning the camera and sliding means for moving the position of the camera. The tilting means comprises a supporter for supporting the camera and a first actuator which is a driving source for turning the supporter and the sliding means comprises a base for turnably holding the supporter and a second actuator which is a driving source for sliding the base.

According to a second aspect of the invention, there is proposed the image print supplier in the first aspect of the invention arranged such that the subject is shot by the camera and its image information is displayed on the display via a half mirror.

According to a third aspect of the invention, there is proposed the image print supplier in the first or second aspect of the invention arranged such that it further comprises a guide piece on which the base is mounted to move the base readily.

According to a fourth aspect of the invention, there is proposed the image print supplier in any one of first through third aspects of the invention arranged such that it further comprises remote control means for controlling the turn or move of the camera from a distant place.

According to a fifth aspect of the invention, there is proposed the image print supplier in any one of first through fourth aspects of the invention arranged such that it gives 3-D coordinate transformation and reduction of 3 to 5 % in the horizontal direction to the image information shot by the camera so that a desirable print image that looks like a well-proportioned figure can be obtained particularly when the whole body of the subject is shot.

The inventive image print supplier allows the optimum shooting point to be controlled finely and the whole body of the subject to be shot readily regardless of the height of the subject because the camera is provided with the functions for making a turn and move.

Further, according to the inventive image print supplier, the subject is shot by the camera and the image is displayed on the display via the half mirror, so that the user can decide the desirable look and pose readily and can obtain more natural image information.

Still more, according to the inventive image print supplier, the base for holding the supporter to which the camera is fixed is mounted and the guide piece for guiding the move of the base is provided, so that the base may be slid stably.

While the user, i.e., the subject, had to move to adjust to the shooting point of the fixed camera up to now, according to the inventive image print supplier, there is provided the remote control means which allows the turn and move of the camera to be controlled from a distant place, so that the user can turn and move the camera and adjust the optimum shooting point at the desirable position.

In addition to that, according to the inventive image print supplier, the image information of the subject shot by the camera or of the whole body of the subject in particular is corrected by the 3-D coordinate transformation and by reduction of 3 to 5 % in the horizontal direction, so that it can supply an image print of the whole body which is shot as if from the

front and which is natural and desirable well-proportioned figure.

The specific nature of the invention, as well as other objects, uses and advantages thereof, will clearly appear from the following description and from the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic perspective view showing an embodiment of an inventive image print supplier;

FIG. 2 is a schematic side section view showing the internal structure of the image print supplier shown in FIG. 1;

FIG. 3 is a block diagram showing the structure of the inventive image print supplier;

FIG. 4 is a schematic front section view showing the structure of panning means and slide means of the inventive image print supplier when a guide piece is provided;

FIG. 5 is a schematic side view showing states of rotation of a supporter and move of a base in the inventive image print supplier;

FIG. 6A is a flowchart showing the flow of the whole processing steps in the inventive image print supplier;

FIG. 6B is a flowchart showing the flow of processing steps when "whole body mode operation" within the flowchart in FIG. 6A is selected;

FIG. 7 is a schematic side view showing the state of a camera of the inventive image print supplier and the positional relationship between the camera and a subject at the time of "camera remote control" within the flowchart in FIG. 6B; and

FIG. 8 shows substituted pictures showing the transition of the image before and after transformation by means of 3-D coordinate transformation.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A preferred embodiment of the invention will be explained below based on the drawings. FIGs. 1 and 2 show an inventive image print supplier in case of shooting a subject by a camera 9 and displaying image information by means of a display 12 via a half mirror 8. The image print supplier is provided with tilting means for turning the camera 9 and sliding means for moving the position of the camera 9.

What is shown in the figures is a so-called twin monitor type image print supplier which is capable of displaying the same image information with the display 12 even from a coordinate input device-attached liquid

crystal monitor 4 in addition to the image information on the display 12 displayed via the half mirror 8. It comprises a coin inserting section 5, lighting 7 and the like beside an input pen 6 for writing data on the outside of a casing 2 and a PC (personal computer) 14, a printer 13 and a coin selector (not shown) within the casing 2 together with the half mirror 8, the camera 9, the display 12 and the like described above.

It is noted the image print supplier shown in the figures is the embodiment in case of shooting by the camera 9 and displaying an image on the display 12 via the half mirror 8, so that the camera 9 is provided within the casing 2 on the opposite side from the subject with the half mirror 8 between. However, when no half mirror 8 is used, the camera 9 is attached at part, such as the outside of the casing 2, where the turn and move of the camera 9 are not hampered.

FIG. 3 is a block diagram showing the structure of the inventive image print supplier and shows the correlation between a hardware section and a software section and the flow of various information and control signals. Although not shown, the half mirror 8 is interposed between the camera 9 and the display 12 as a matter of course in the present invention using the half mirror.

FIG. 4 shows the structure of tilting means for turning the camera 9 in the inventive image print supplier and sliding means for moving its position, wherein a guide piece 25 for smoothly and stably guiding a base 17 is provided.

The tilting means for turning the camera 9 comprises mainly a supporter 15 for holding the camera 9 and a first actuator 18 which is a driving source for turning the supporter 15. A gear 21 attached to the first actuator 18 engages with a gear 22 attached to the supporter 15. Although the camera 9 is connected and fixed to a connecting piece 16 attached to the supporter 15 and turns in a body with the supporter 15, its mounting method is not limited only to this method.

The sliding means for moving the position of the camera 9 mainly comprises the base 17 for turnably holding the supporter 15 and a second actuator 20 which is a driving source for sliding the base 17. A gear 23 attached to the second actuator 20 engages with a gear 24 which turns in synchronism with a turning belt 19 which is partially connected with the base 17.

It is noted that a stepping motor is planned to be adopted in the present invention for the first actuator 18 and the second actuator 20, the invention is not limited specifically to such a case. Further, although

the supporter 15 for holding the camera 9 is turned and the base 17 for holding the supporter 15 is moved by the tilting means and sliding means described above, it is possible to replace them with equalizing means when driving force of the first actuator 18 and the second actuator 20 is to be utilized.

FIG. 5 is a schematic side view showing states of the turn of the supporter 15 supporter and the move of the base 17, wherein the base 17 moves along the turn of the turning belt 19 without changing its stance and the supporter 15 turns together with the camera 9 while being held by the base 17.

FIG. 6A is a flowchart showing the whole processing steps of the inventive image print supplier and FIG. 6B is a flowchart showing the processing steps when a "whole body mode operation" within the flowchart in FIG. 6A is selected. Although a fixed type camera has been used in many of the prior art image print suppliers, the invention allows the camera 9 to be turned and moved by using remote control means 26 such as an infrared remote controller in shooting the whole body, so that it has a processing step of a "camera remote control".

FIG. 7 is a schematic side view showing the state of the camera 9 of the inventive image print supplier and the positional relationship between the camera 9 and a

subject in the step of "camera remote control" in FIG. 6B. While the user, i.e., the subject, is positioned at position (a) in the figure, i.e., in front of the main body 1 of the apparatus, and the camera 9 needs not be turned nor moved and is positioned at region (A) in the figure in shooting around the face and the chest, the user recedes around to position (b) in the figure and the camera 9 is moved to region (B) in the figure and is turned so that the lens thereof captures the whole body of the subject in shooting the whole body of the subject.

FIG. 8 shows substituted pictures showing the transition of the image before and after its transformation implemented to image information of the whole body of the subject shot by using the inventive image print supplier by means of 3-D coordinate transformation in three steps. While the face and the upper half of the body of the subject are greatly stressed in the image (X) in the figure before the transformation, it will be understood that the whole body is reproduced in the natural impression as if it is shot almost in front of that after the transformation, i.e., in the image (Z) in the figure.

The process flow for reproducing an image print of the whole body of the subject by using the inventive image print supplier when the half mirror 8, the guide

piece 25 and the remote control means 26 are provided and when image information of the shot subject is reduced by means of 3-D coordinate transformation will be explained.

At first, a user puts a predetermined coin into the coin inserting section 5 to put the main body 1 of the image print supplier into a usable state. Next, the user selects an item of the "whole mode operation" by using the attached input pen 6 among various modes displayed on the coordinate input device attached liquid crystal monitor 4.

Then, after selecting a desired printing direction (horizontal or vertical), a frame and a background, the user, i.e., the subject, keeps a distance from the main body 1 and recedes around to the position (b) in FIG. 7 suitable for shooting the whole body. Because the machine is provided with the remote control means 26 and allows various commands and controls to be made from a distant position, the user can give various commands to the main body 1 at the desirable position by moving while carrying the remote control means 26. Normally, the position suitable for shooting the whole body is the position leaning most to a curtain 11 hung from the end of an arm 10 extending from the casing 2.

Next, the user moves the base 17 to the region around (B) in FIG. 7 by monitoring the screen 3 and by

using the remote control means 26 and turns the supporter 15 holding the camera 9 until when the whole body is shown. The user also controls the size of the image by zoom. It is noted that because the guide piece 25 for mounting and guiding the base 17 is provided, the base 17 can move on the guide piece 25 smoothly and stably. Further, because the subject is shot and its image information is displayed via the half mirror 8, the user, i.e., the subject, can decide a favorable look and pose while always monitoring the screen 3.

When the adjustment of the region of the camera 9 is completed so that the desired image information of the whole body is shot, the user shoots by using the remote control means 26. Next, because the shot image is displayed on the screen 3, the user can select "Decided" when the user likes the image and the machine moves to the next operation. When the user dislikes the image however, the user can select "Cancel" and the machine returns to the previous step of "Camera remote control" in FIG. 6B. Then, the shoot is taken again by re-adjusting the region of the camera 9.

When the user likes the shot image and selects "Decided", the user returns to the main body 1. Then, the user selects a desirable message and color and writes preferable letters and graphics by the input pen 6 on the

coordinate input device attached liquid crystal monitor 4. Then, the whole steps end and the desired image print is supplied after a while.

It is noted that although only the print in which the face and the upper half of the body are greatly stressed is obtained when the shot image information is left as it is because the camera 9 moves upward as shown in FIG. 7 when the whole body of the subject is to be shot, the inventive image print supplier corrects the distorted shot image to an image seen from the front by the 3-D coordinate transformation and reduces in the horizontal direction by 3 to 5 %. Therefore, it allows an image print which has been shot as if from the front and corrected smartly so that an image like a well-proportioned figure is obtained. It is noted that as a result of experiments, experimental data has been obtained that when the shot image information is corrected by exceeding 3 to 5 %, the image is reproduced in an unnatural shape even when the correction is the reduction or expansion, so that it is desirable to correct the image within this range. It is noted that the 3-D coordinate transformation of the image information is executed by software of the PC (personal computer) 14.

The inventive image print supplier allows the optimum shooting point to be controlled finely and the

whole body of a subject to be shot readily by allowing the turn and move of the position of the camera to be made.

Further, according to the second aspect of the invention, the subject is shot by the camera and the image is displayed on the display via the half mirror, so that the user, i.e., the subject, can decide the desirable look and pose while always monitoring own image information on the screen.

Still more, according to the third aspect of the invention, the guide piece for guiding the move of the base is provided, so that the move of the position of the camera attached to the supporter held by the base is implemented smoothly and stably.

According to the fourth aspect of the invention, there is provided the remote control means which allows various command signals to be sent to the main body of the machine from a distant place, so that the user can instruct and control the turn and move of the camera, the shooting and others by moving to the position suitable for shooting the whole body by carrying it and by staying at that position in shooting the whole body.

In addition to that, according to the fifth aspect of the invention, the image information of the shot subject or the whole body of the subject in particular is

automatically reduced and corrected by 3 to 5 % by the 3-D coordinate transformation and others, so that it allows an image print of the whole body which is taken as if from the front and which is smart to be reproduced.

While the preferred embodiment has been described, variations thereto will occur to those skilled in the art within the scope of the present inventive concepts which are delineated by the following claims.

What is claimed is :

1. An image print supplier, comprising at least :

a camera for shooting image information of a subject and a display for displaying the image information of the subject shot by said camera wherein the subject is shot by said camera and image information is displayed on said display via a half mirror;

said camera being provided with tilting means for turning said camera and sliding means for moving the position of said camera to the oblique direction along said half mirror;

said tilting means comprising a supporter for supporting said camera and a first actuator which is a driving source for turning said supporter; and

said sliding means comprising a base for turnably holding said supporter and a second actuator which is a driving source for sliding said base.

2. The image print supplier according to claim 1, further comprising a guide piece on which said base is mounted to guide its move.

3. The image print supplier according to claim 1 or 2, wherein the image information of the subject shot by said camera is corrected by 3-D coordinate transformation and by reduction of 3 to 5% in the horizontal direction.

ABSTRACT

IMAGE PRINT SUPPLYING MACHINE

There is provided an image print supplier, at low cost, which is arranged to be able to freely adjust a shooting point of a camera regardless of the height of a subject by giving turning and moving functions to the camera, to shoot the whole body of the subject and to supply natural image prints as if the subject is shot from the front. The image print supplier comprises at least a camera for shooting image information of a subject and a display for displaying the image information of the subject shot by the camera. The camera is provided with tilting means for turning the camera and sliding means for moving the position of the camera. The tilting means comprises a supporter for supporting the camera and a first actuator which is a driving source for turning the supporter and the sliding means comprises a base for turnably holding the supporter and a second actuator which is a driving source for sliding the base.

(FIG. 1)

FIG. 3:

- #1: SUBJECT**
- #2: DIGITIZER**
- #3: LIQUID CRYSTAL MONITOR**
- #4: REMOTE CONTROLLER**
- #5: PRINTER**
- #6: CCD CAMERA**
- #7: CRT**
- #8: RGB DISTRIBUTOR**
- #9: SPEAKER**
- #10: I/O BOX**
- #11: I/O BLOCK**
- #12: RECEIVER**
- #13: IC CARD READER**
- #14: BILL VALIDITY/COIN SECTION**
- #15: ILLUMINATING SECTION**
- #16: INTERNAL PANEL SECTION**
- #17: CAMERA MOVING UNIT**
- #18: PC BLOCK**
- #19: SCSI CARD**
- #20: DIGITAL VIDEO CAPTURE CARD**
- #21: DISPLAY CARD**
- #22: SERIAL PORT**
- #23: SOUND CARD**
- #24: DIGITAL I/O CONTROL CARD**

#25: CENTRAL PROCESSING UNIT
#26: HARD DISK DRIVE
#27: CD-ROM DRIVE
#28: POWER SOURCE CONTROL SECTION
#29: COMMERCIAL POWER (AC 100 V)
#30: EPO

FIG. 6A:

#1: START
#2: INITIAL PROCESSING
#3: ADVERTISING DISPLAY
#4: CREDIT TOUCH HOLD?
#5: MODE SELECTION
#6: WHOLE BODY MODE OPERATION
#7: UPPER HALF BODY MODE OPERATION
#8: FACE-UP MODE OPERATION
#9: PRINT SEAL
#10: MINI-GAME HIT?
#11: DISPLAY HIDDEN COMMAND
#12: RE-PRINT?

FIG. 6B:

#1: START WHOLE BODY MODE
#2: ORIENTATION OF PRINT
#3: VERTICAL

#4: SAME WITH HORIZONTAL ONE DOWNWARD
#5: HORIZONTAL
#6: SELECT FRAME
#7: SELECT BACKGROUND (CHROMAKEY)
#8: REMOTE-CONTROL CAMERA
#9: CONTROL ZOOM
#10: DISPLAY COUNT-DOWN
#11: SHOOT
#12: CANCEL
#13: CONFIRM
#14: SELECT MESSAGE/SPECIAL COLOR
#15: SCRIBBLING
#16: END

FIG. 8:

#1: SUBSTITUTED PICTURES
#X: BEFORE TRANSFORMATION
#Y: AFTER TRANSFORMATION
#Z: AFTER TRANSFORMATION (REDUCTION OF 4 %)