AN IMAGE CAPTURING APPARATUS ABLE TO BE DRAPED ON A STAND AND A METHOD FOR PROVIDING AN IMAGE WITH EYE-TO-EYE CONTACT WITH A RECIPIENT

FIELD OF INVENTION

The present invention relates to the field of image capturing apparatus and image transmission, particularly in relation to an image capturing apparatus which is able to be draped on a stand and a method for providing an image which provides eye-to-eye contact with a recipient.

BACKGROUND

The ready availability and variety of free instant messaging applications for computers in the world today has led to an increase in the use of such applications for communications. As many of these applications support the use of image capturing devices like webcams, video-based communications is also increasing in popularity.

The majority of webcams currently available to the masses are either mounted onto display screens or placed on a platform during use. There are also webcams that are integrated in the display cases of monitors. The aforementioned webcams typically are able to capture images of a person positioned in front of a lens of the webcams. However, there are often issues relating to how the person in front of the lens of the webcam appears to be looking in a direction away from a recipient who is communicating with the person. This is because the eyes of the person in front of the lens of the webcam are typically looking at contents shown on a display screen, and not the lens of the webcam per se.

In this regard, even though video-based communications is readily available, many people rather avoid using it as there is no eye-to-eye type of communication using the aforementioned webcams. This is because of the

difference of such a communication experience compared to having an actual face-to-face conversation in relation to a perceived lack of eye-to-eye contact.

Thus, it would be desirable if a webcam used for video-based communications is able to facilitate an eye-to-eye type of communication and more effectively replicate an actual face-to-face conversation.

SUMMARY

In a first aspect, there is provided an image capturing apparatus able to be draped onto a stand. The apparatus includes an image capture module for capturing at least one image; and a flexible cable originating from the image capture module for connection of the image capture module to a host. The flexible cable may be for supporting the image capture module at a desired position when the image capturing apparatus is draped onto the stand. Advantageously, locating the image capture module at the desired position enables a user to look at a lens of the image capture module in a manner where a recipient of an image of the user views the user looking directly at the recipient during a video conference session. The desired position may preferably be substantially aligned with a T-zone of the user's face.

Preferably, the image capture module is able to capture both moving images and audio. The stand may be either a screen (eg. a flat screen monitor or a CRT monitor) or a structure. The flexible cable may be sheathed in a flexible casing with the casing having a substantially rectangular cross-section. The flexible cable may only be partially sheathed along a first portion of the flexible cable by the flexible casing.

It is advantageous that an external surface of the flexible casing in contact with the stand has a high coefficient of friction to prevent movement of the image capture module when the image capture module is at the desired position.

The image capturing apparatus may also including a counter-balance weight located along a length of the flexible cable, with the weight being slidable along the length of the flexible cable to maintain the desired position of the image capture module when the image capturing apparatus is draped onto the stand. It is advantageous that the counter-balance weight acts as a spindle for coiling of the flexible cable. Coiling the flexible cable on the counter-balance weight may vary a weight of the counter-balance weight. It is also advantageous that the counter-balance weight includes a receptor to receive the image capture module to protect the lens of the image capture module. The receptor may be able to receive a lens cowl of the image capture module. The counter-balance weight may be located at a first end of the flexible casing, with a second end of the flexible casing being at the image capture module.

The image capture module may be rotatable from a first orientation to a second orientation. The image capture module may capture images in a narrow field of vision in the first orientation and in a wide field of vision in the second orientation. It is advantageous that rotating the image capture module actuates a change in a captured field of vision by the image capture module. The change in a captured field of vision may be rendered by either hardware or software.

In a second aspect, there is provided a method for enabling a user to appear to be looking directly at a recipient of an image of the user, wherein an image capturing module is located at least a pre-determined distance above a head of an image of the recipient such that the user is able to continually look at the image of the recipient while the user's head movements are captured by the image capturing module. Preferably, the pre-determined distance above the head of the image is within a boundary of a screen. The image capturing module may be located at least a pre-determined distance above the head of the image by using a non-permanent affixing device. The non-permanent affixing device may be, for example, at least one suction cup, adhesive putty, at least one pair of Velcro strips, or double-sided adhesive strips and so forth. It is preferable that the pre-determined distance may be between one to ten

centimetres. It is preferable that the user is able to position the image capturing module by viewing a preview image of the user.

DESCRIPTION OF DRAWINGS

In order that the present invention may be fully understood and readily put into practical effect, there shall now be described by way of non-limitative example only preferred embodiments of the present invention, the description being with reference to the accompanying illustrative drawings.

Figure 1 shows a side view of a first embodiment of the present invention during use.

Figure 2 shows a side view of a second embodiment of the present invention during use.

Figure 3 shows a frontal view of the first embodiment.

Figure 4 shows a frontal view of the second embodiment.

Figure 5 shows a side view of a counter-balance weight of the second embodiment.

Figure 6 shows a cross-sectional view of a flexible casing of the second embodiment.

Figure 7 shows sequential views of the second embodiment being arranged for storage.

Figure 8 shows a scene captured by an image capture module.

Figure 9 shows rotation of an image capture module.

Figure 10 shows how rotation of an image capture module affects a image capture chip of the image capture module.

Figure 11 shows a positioning of an image capture module for enabling transmission of eye-to-eye contact with a recipient.

DESCRIPTION OF PREFERRED EMBODIMENTS

The apparatus of the present invention will be described in relation to two embodiments. While the two embodiments are distinctly separate, it is understood that features from both embodiments may be combined and may

give rise to further variations of the present invention. However, the further variations of the present invention will fall within the scope of the description in the following portion.

Figures 1 and 3 both show different views of a first embodiment of the present invention. Figure 1 shows a side view of the first embodiment during use while Figure 3 shows a frontal view of the first embodiment. In the first embodiment, there is provided an image capturing apparatus 20 able to be draped onto a stand 22. The stand 22 may either a screen (as shown in Figure 1) or a structure. The screen may be either a flat screen monitor or a CRT monitor (as shown in Figure 1). The structure may be any object which is able to allow the draping of the image capturing apparatus 20.

The apparatus 20 includes an image capture module 24 for capturing at least one image. The image capture module 24 may function like a webcam, and may be able to capture both moving images and audio. The apparatus 20 also includes a flexible cable 26 originating from the image capture module 24 for connection of the image capture module 20 to a host using a connector 34. The host may be a personal computer or a notebook computer which is able to enable video communications.

The flexible cable 26 may contain a plurality wires which allow power to be transmitted to the image capture module 24, and for the captured images and audio to be transmitted to the host. Furthermore, the flexible cable 26 may be for supporting the image capture module 24 when the image capture module 24 is located at a desired position 28 when the image capturing apparatus 20 is draped onto the stand 22. The flexible cable 26 may have a surface (either in parts or completely) with a high coefficient of friction to prevent movement of the image capture module 24 when the image capture module 24 is at the desired position 28. The high coefficient of friction of the surface of the flexible cable may prevent sliding at an area(s) of contact 38 with the stand 22. The desired position 28 may be substantially aligned with a T-zone 30 of the user's face 32.

When the image capture module 24 is located at the desired position 28, the user is able to look at a lens 36 of the image capture module 24 in a manner where a recipient of an image of the user views the user looking directly at the recipient during a video conference session. An example is shown in Figure 8, where people 82, 84, 86 in a picture 80 appear to be looking directly at a reader of this specification.

The first embodiment of the image capturing apparatus 20 may further include a counter-balance weight located along a length of the flexible cable 26. The counter-balance weight is not shown in Figures 1 and 3 as it may be identical to the counter-balance weight which will be described in greater detail for a second embodiment of the image capturing apparatus 20. The counter-balance weight may be slidable along the length of the flexible cable 26 to maintain the desired position 28 of the image capture module 24 when the image capturing apparatus 20 is draped onto the stand 22. The slidable aspect of the counter-balance weight works on a principle of balancing moments. Besides aiding in maintaining the desired position 28 of the image capture module 24, the counter-balance weight may also act as a spindle for coiling of the flexible cable 26 for storage. Consequently, coiling the flexible cable 26 on the counter-balance weight typically varies a weight of the counter-balance weight. Thus, the counter-balance weight may aid in maintaining the desired position 28 of the image capture module 24 by varying a location of the counter-balance weight along the length of the flexible cable 26, varying a weight of the counter-balance weight, or by using both of the aforementioned variations.

Furthermore, the counter-balance weight may also include a receptor to receive the image capture module 24 to protect the lens 36 of the image capture module 24. Specifically, the receptor may receive a lens cowl 40 of the image capture module 24.

Figures 2 and 4 both show different views of a second embodiment of the present invention. Figure 2 shows a side view of the second embodiment during use while Figure 4 shows a frontal view of the second embodiment. In

the second embodiment, there is provided an image capturing apparatus 50 able to be draped onto a stand 52. The stand 52 may either a screen (as shown in Figure 2) or a structure. The screen may be either a flat screen monitor (as shown in Figure 1) or a CRT monitor. The structure may be any object which is able to allow the draping of the image capturing apparatus 50.

The apparatus 50 includes an image capture module 54 for capturing at least one image. The image capture module 54 may function like a webcam, and may be able to capture both moving images and audio. The apparatus 50 also includes a flexible cable 56 originating from the image capture module 54 for connection of the image capture module 50 to a host using a connector 64. The host may be a personal computer or a notebook computer which is able to enable video communications. The image capture module 54 of the second embodiment may be identical to the image capture module 24 of the first embodiment.

The flexible cable 56 may contain a plurality wires which allow power to be transmitted to the image capture module 54, and for the captured images and audio to be transmitted to the host. Furthermore, the flexible cable 56 may be for supporting the image capture module 54 when the image capture module is located at a desired position 58 when the image capturing apparatus 50 is draped onto the stand 52. The desired position 58 may be substantially aligned with a T-zone 30 of the user's face 32.

When the image capture module 54 is located at the desired position 28, the user is able to look at a lens 19 of the image capture module 54 in a manner where a recipient of an image of the user views the user looking directly at the recipient during a video conference session. An example is shown in Figure 8, where people 82, 84, 86 in a picture 80 appear to be looking directly at a reader of this specification.

The flexible cable 56 may be sheathed in a flexible casing 66. The casing 66 may have a substantially rectangular cross-section as shown in Figure 6. While the flexible cable 56 is shown in Figure 6 to be a single cable, it should

be understood that flexible cable 56 may be, for example, an interwoven set of wires, a layered set of wires, a coiled set of wires, and so forth. The flexible casing 66 may be made from, for example, stretchable fabric, silicone, latex, stretchable polymer sheets and so forth. In the second embodiment, the flexible cable may be partially sheathed along a first portion 68 of the flexible cable 56 by the flexible casing 66. An external surface 75 (either in parts or completely) of the flexible casing 66 in contact with the stand 52 may have a high coefficient of friction to prevent movement of the image capture module 54 when the image capture module 54 is at the desired position 58. The high coefficient of friction of the surface 75 of the flexible cable 56 may prevent sliding at an area(s) of contact 61 with the stand 52.

The second embodiment of the image capturing apparatus 50 may further include a counter-balance weight 70 located along a length of the flexible cable 56. The counter-balance weight 70 may be located at a first end 71 of the flexible casing 66, with a second end 73 of the flexible casing 66 being at the image capture module 54. The counter-balance weight 70 may be slidable along the length of the flexible cable 56 to maintain the desired position 58 of the image capture module 54 when the image capturing apparatus 50 is draped onto the stand 52. The slidable aspect of the counter-balance weight 70 works on a principle of balancing moments.

Besides aiding in maintaining the desired position 58 of the image capture module 54, the counter-balance weight 70 may also act as a spindle 79 (refer to Figure 5 which shows a side view of the counter-balance weight 70) for coiling of a second portion 69 of the flexible cable 26 for storage. It should be noted that the second portion 69 is shown to be of minimal length merely for illustrative purposes. The second portion 69 may be significantly longer than the first portion 68 and vice versa. Consequently, coiling the second portion 69 of the flexible cable 26 on the counter-balance weight 70 typically varies a weight of the counter-balance weight 70. Thus, the counter-balance weight 70 may aid in maintaining the desired position 58 of the image capture module 54 by varying a location of the counter-balance weight 70 along the second

portion 69 of the flexible cable 56, varying a weight of the counter-balance weight 70, or by using both of the aforementioned variations.

Furthermore, the counter-balance weight 70 may also include a receptor 74 to receive the image capture module 54 to protect the lens 19 of the image capture module 54. Specifically, the receptor 74 may receive a lens cowl 76 surrounding the lens 19 of the image capture module 24. It should be noted that while the receptor 74 is physically configured to receive the lens cowl 76 in this instance, the receptor 74 may also be physically configured to receive the image capture module 24 in its entirety.

Figure 7 shows how the receptor 74 receives the lens cowl 76 of the image capture module 24. In Figure 7(a), the image capturing apparatus 50 is shown with the second portion 69 of the flexible cable 56 already coiled around the spindle 79 of the counter-balance weight 70. With reference to a position of a reader of this specification, the image capture module 54 is lifted towards the reader and flipped as per arrow 100 such that the lens cowl 76 of the image capture module 24 is able to couple with the receptor 74 of the counter-balance weight 70 as shown in Figure 7(b). When the image capturing apparatus 50 is in a form as shown in Figure 7(b), it may be for storage of the image capturing apparatus 50.

The following feature as shown in Figures 8 and 9 may apply to both the first and second embodiments. However, the description is limited to the image capture module 54 of the second embodiment to avoid confusion. The image capture module 54 of the image capturing apparatus 50 may be rotatable 53 from a first orientation as shown in Figure 9(i) to a second orientation as shown in Figure 9(ii). The rotation 53 of the image capture module 54 shown in Figure 9 is not limited to anti-clockwise as shown, and the rotation 53 of the image capture module 54 could also be clockwise.

The first orientation may be known as a length-wise orientation while the second orientation may be known as a breadth-wise orientation. The rotation of the image capture module 54 from the first orientation to the second

orientation and vice versa may be enabled by any known rotation device/hinge/joint attached to the image capture module 54.

Rotation 53 of the image capture module 54 may vary a form of images being captured by the image capture module 54. For example, the image capture module 54 may capture images in a wide field of vision when the image capture module 54 is positioned in the first orientation as shown in Figure 9(i). Correspondingly, the image capture module 54 may capture images in a narrow field of vision when the image capture module 54 is positioned in the second orientation as shown in Figure 9(ii). It should be noted that the aforementioned setting may be reversed. That is, the image capture module 54 may capture images in a narrow field of vision when the image capture module 54 is positioned in the first orientation as shown in Figure 9(i) and in a wide field of vision when the image capture module 54 is positioned in the second orientation as shown in Figure 9(ii).

Using the picture 80 in Figure 8 as an example, the wide field of vision is shown as bound by a length-wise border 88, while the narrow field of vision is shown as bound by a breadth-wise border 89. It is evident that the wide field of vision is preferable for the capture of images involving groups of people while the narrow field of vision is preferable for the capture of images involving a single person. Thus, being able to rotate 53 the image capture module 54 allows for the image capturing apparatus 50 to be able to capture images optimally in accordance with a number of persons in the image(s) to be captured.

Rotating 53 the image capture module 54 actuates a change in the captured field of vision by the image capture module 54. The change in the captured field of vision may be rendered by a combination of hardware and software.

For example, referring to Figure 10, changing the captured field of vision by hardware may be in a manner where rotating the image capture module 54 causes an image capture chip 200 (shown on the outside of the image capture module 54 for illustrative purposes) in the image capture module 54 to

be physically rotated 53 from a first angle to a second angle as the chip 200 may be positioned in a fixed configuration in relation to the image capture module 54. When the image capture module 54 is rotated 53, the fixed configuration of the image capture chip 200 causes an image to be captured differently, with the captured image being re-adjusted by software such that the captured image always appears to be upright and not side-ways. It should be noted that other ways of varying the captured field of vision may be employed.

In a final aspect as shown in Figure 11, there is provided a method for providing an image with a user appearing to be looking directly at a recipient of an image of the user by using the image capturing apparatus 20, 50 as described earlier. It should be noted that other types of image capturing apparatus may also be used. The image capturing apparatus may be used with a host like either a personal computer or a notebook computer which is able to enable video communications. In the method, it is preferable that an image capturing module (the image capturing module 54 of apparatus 50 is shown for illustration) is located at least a pre-determined distance 104 above a head 200 of an image 102 of the recipient such that the user is able to continually look at the image 102 of the recipient while the user's head movements are captured by the image capturing module 54.

Referring to Figure 11, the pre-determined distance 104 above the head 200 of the image 102 may be within a boundary 106 of the screen 22, 52 of the type shown in Figures 1 and 2 respectively. Screen 52 shall be chosen for illustrative purposes. The pre-determined distance 104 may be between one and ten centimetres. Typically, the user would be able to position the image capturing module 54 where a preview image 108 of the user on the screen 22, 52 would indicate whether the user is looking directly at the recipient of the image. This is because once the preview image 108 of the user appears to be looking directly towards the user, it means that the recipient also views the user as looking in a direct manner, thus, the image capturing module 54 is correctly positioned.

The preview image 108 may be located anywhere on the screen 22. Thus, the preview image 108 may act as an aid to locating the image capturing module 54. However, the image capturing module 54 may be located at the pre-determined distance 104 without a presence of the preview image 108. The image capturing module 54 may be located at least the pre-determined distance above the head of the image by using a non-permanent affixing device. The non-permanent affixing device may be, for example, at least one suction cup, adhesive putty, at least one pair of Velcro strips, and double-sided adhesive strips.

Whilst there has been described in the foregoing description preferred embodiments of the present invention, it will be understood by those skilled in the technology concerned that many variations or modifications in details of design or construction may be made without departing from the present invention.

CLAIMS

1. An image capturing apparatus able to be draped onto a stand, the apparatus including:

an image capture module for capturing at least one image; and

a flexible cable originating from the image capture module for connection of the image capture module to a host, the flexible cable being for supporting the image capture module at a desired position when the image capturing apparatus is draped onto the stand,

wherein locating the image capture module at the desired position enables a user to look at a lens of the image capture module in a manner where a recipient of an image of the user views the user looking directly at the recipient.

2. The image capturing apparatus of claim 1, wherein the image capture module is able to capture both moving images and audio.

3. The image capturing apparatus of claim 1, wherein the stand is either a screen or a structure.

4. The image capturing apparatus of claim 3, wherein the screen is either a flat screen monitor or a CRT monitor.

5. The image capturing apparatus of claim 1, wherein the flexible cable is sheathed in a flexible casing with the casing having a substantially rectangular cross-section.

6. The image capturing apparatus of claim 5, wherein an external surface of the flexible casing in contact with the stand has a high coefficient of friction to prevent movement of the image capture module when the image capture module is at the desired position.

7. The image capturing apparatus of claim 5, wherein the flexible cable is only partially sheathed along a first portion of the flexible cable by the flexible casing.

8. The image capturing apparatus of claim 1, further including a counter-balance weight located along a length of the flexible cable, the weight being slidable along the length of the flexible cable to maintain the desired position of the image capture module when the image capturing apparatus is draped onto the stand.

9. The image capturing apparatus of claim 8, wherein the counter-balance weight acts as a spindle for coiling of the flexible cable.

10. The image capturing apparatus of claim 9, wherein coiling the flexible cable on the counter-balance weight varies a weight of the counter-balance weight.

11. The image capturing apparatus of claim 8, wherein the counter-balance weight includes a receptor to receive the image capture module to protect the lens of the image capture module.

12. The image capturing apparatus of claim 11, wherein the receptor receives a lens cowl of the image capture module.

13. The image capturing apparatus of claim 7, further including a counter-balance weight located at a first end of the flexible casing, a second end of the flexible casing being at the image capture module.

14. The image capturing apparatus of claim 13, wherein the counter-balance weight acts as a spindle for coiling of a second portion of the flexible cable.

15. The image capturing apparatus of claim 14, wherein coiling the second portion of the flexible cable on the counter-balance weight varies a weight of the counter-balance weight.

16. The image capturing apparatus of claim 13, wherein the counter-balance weight includes a receptor to receive the image capture module to protect the lens of the image capture module.

17. The image capturing apparatus of claim 16, wherein the receptor receives a lens cowl of the image capture module.

18. The image capturing apparatus of claim 1, wherein the image capture module is rotatable from a first orientation to a second orientation.

19. The image capturing apparatus of claim 18, wherein the image capture module captures images in a narrow field of vision in the first orientation and in a wide field of vision in the second orientation.

20. The image capturing apparatus of claim 18, wherein rotating the image capture module actuates a change in a captured field of vision by the image capture module.

21. The image capturing apparatus of claim 20, wherein the change in a captured field of vision is rendered by either hardware or software.

22. The image capturing apparatus of claim 1, wherein the desired position is substantially aligned with a T-zone of the user's face.

23. The image capturing apparatus of claim 1, wherein the recipient of an image of the user views the user looking directly at the recipient during a video conference session.

24. A method for providing an image with a user appearing to be looking directly at a recipient of an image of the user, wherein an image capturing

module is located at least a pre-determined distance above a head of an image of the recipient such that the user is able to continually look at the image of the recipient while the user's head movements are captured by the image capturing module.

25. The method of claim 24, wherein the pre-determined distance above the head of the image is within a boundary of a screen.

26. The method of claim 24, wherein the image capturing module is from the image capturing apparatus of claim 1.

27. The method of claim 24, wherein the image capturing module is located at least a pre-determined distance above the head of the image using a non-permanent affixing device.

28. The method of claim 27, wherein the non-permanent affixing device is selected from a group comprising: at least one suction cup, adhesive putty, at least one pair of Velcro strips, and double-sided adhesive strips.

29. The method of claim 24, wherein the pre-determined distance is between one to ten centimetres.

30. The method of claim 24, wherein the user would be able to position the image capturing module by viewing a preview image of the user.