DESCRIPTION

REMOTE WORK SUPPORT SYSTEM

TECHNICAL FIELD

The present disclosure relates to a remote work support system for allowing a support operator located in a remote location to support a worker at a work site.

BACKGROUND ART

A remote work support system is known in which a worker is equipped with a camera terminal and a support operator in a remote location operates the camera terminal to support the worker. PTL 1 (Japanese Unexamined Patent Publication No. 2018-207420) discloses a work support system that enables a worker to check an object to work via voice communication without using a display device.

SUMMARY OF INVENTION

<Technical Problem>

Various types of wearable devices have also been devised. An eyeglass-type device is capable of displaying information in or near portions corresponding to lenses of eyeglasses. In a case where an eyeglass-type device is used to support a worker, display of an image or the like transmitted from a support operator on eyeglass lenses reduces the field of vision of the worker, which may reduce work efficiency and cause danger. However, conversely, a worker terminal (wearable device) without a display faces a dilemma in that the worker is not allowed to check the image transmitted from the support operator.

<Solution to Problem>

A remote work support system according to a first aspect includes a wearable device, a mobile terminal, and a support operator terminal. The wearable device is to be worn by a site worker. The wearable device includes an image capturing unit, a voice input unit, and a voice output unit. The wearable device transmits an image and transmits and receives voice. The mobile terminal is to be carried by the site worker separately from the wearable device. The mobile terminal includes a display unit that displays a received image. The support operator terminal is to be used by a support operator who remotely supports the site worker. The support operator

terminal includes a voice input unit, a voice output unit, and a display unit. The support operator terminal transmits and receives voice to and from the wearable device, receives an image from the wearable device, and transmits an image to the mobile terminal.

In the ~~remote work support system according to the first~~above aspect, the wearable device includes no display, and the site worker is able to secure a sufficient field of view and perform work safely. On the other hand, an image can be displayed on the mobile terminal when necessary. This enables the site worker to view the content of an instruction from the remote support operator on a screen of the display unit.

~~A~~In an embodiment of the remote work support system ~~according to a second aspect is the system according to the first aspect, in which,~~ the wearable device is a neck-mounted device.

In the ~~remote work support system according to the second aspect~~above embodiment, the wearable device is a neck-mounted device, which enables the site worker to work with both hands free and to also perform work efficiently without interference with the field of view.

~~A~~In an embodiment of the remote work support system ~~according to a third aspect is the system according to the first aspect or the second aspect, in which,~~ the display unit of the support operator terminal displays a moving image and a still image that are captured with the image capturing unit of the wearable device.

~~A~~In an embodiment of the remote work support system ~~according to a fourth aspect is the system according to any of the first aspect to the third aspect, in which,~~ an image captured with the image capturing unit of the wearable device is selected, processed, or additionally provided with information using the support operator terminal, is transmitted to the mobile terminal, and is displayed on the display unit of the mobile terminal.

The ~~use of the remote work support system according to the fourth aspect~~above embodiment enables the site worker to receive support by using an image of the site that is processed and additionally provided with information, without capturing an image with particular consciousness. Thus, work efficiency is increased.

~~A~~In an embodiment of the remote work support system ~~according to a fifth aspect is the system according to any of the first aspect to the fourth aspect, in which,~~ an utterance of the site worker and an utterance of the support operator are subjected to voice recognition and are displayed on the display unit of the support operator terminal as text information.

In the ~~remote work support system according to the fifth aspect~~above embodiment, the

support operator is able to perform support while checking a telephone conversation with the site worker by using text information. Thus, the support operator can work efficiently without having to take a note.

~~A~~In an embodiment of the remote work support system ~~according to a sixth aspect is the system according to the fifth aspect, in which,~~ the text information is further displayed on the display unit of the mobile terminal.

In the ~~remote work support system according to the sixth aspect~~ above embodiment, the site worker is able to check a telephone conversation with the support operator by text.

~~A~~An embodiment of the remote work support system ~~according to a seventh aspect is the system according to any of the first aspect to the sixth aspect, including~~includes a first line and a second line. The first line connects the support operator terminal and the wearable device. The second line connects the support operator terminal and the mobile terminal. The first line is continuously used while the site worker works. The second line is connected, as necessary, while the site worker works.

In the ~~remote work support system according to the seventh aspect~~above embodiment, the first line and the second line are selectively used, and the second line is used only when necessary, which eliminates the need for the site worker to operate the mobile terminal more than necessary because the second line can be used only when necessary.

~~A~~In an embodiment of the remote work support system ~~according to an eighth aspect is the system according to any of the first aspect to the seventh aspect, in which,~~ progress of work performed by the site worker is automatically extracted from an image captured with the image capturing unit and/or from an utterance of the site worker and an utterance of the support operator. A state of progress of the work or an end time of the work is estimated from the automatically extracted image or voice. The estimated state of progress or end time is displayed on the display unit of the support operator terminal.

The ~~remote work support system according to the eighth aspect~~above embodiment allows the support operator to monitor the state of progress of the work.

~~A~~In an embodiment of the remote work support system ~~according to a ninth aspect is the system according to any of the first aspect to the eighth aspect, in which,~~ the support operator terminal accesses a database that stores site work support information, extracts and processes the site work support information, and transmits the extracted and processed site work support

information to the mobile terminal.

The ~~use of the remote work support system according to the ninth aspect~~above embodiment allows the site worker to receive extracted and processed site work support information and to thus efficiently proceed with the work.

~~A~~In an embodiment of the remote work support system ~~according to a tenth aspect is the system according to any of the first aspect to the ninth aspect, in which,~~ support for the site worker through the support operator terminal includes any one or a combination of support by voice, support with a processed image, support by text input from the support operator terminal, and support by characters obtained by converting an utterance of the support operator into text.

~~A~~An embodiment of the remote work support system ~~according to an eleventh aspect is the system according to any of the first aspect to the tenth aspect, including~~ includes a plurality of devices connectable to an identical server. The plurality of devices include the wearable device, the mobile terminal, and the support operator terminal. The server designates at least one or more devices among the plurality of devices in accordance with a predetermined condition, and calls a connection target device in accordance with the designation.

~~A~~In an embodiment of the remote work support system ~~according to a twelfth aspect is the system according to the eleventh aspect, in which,~~ the server acquires environment information of a work site of the site worker. The server calls at least one or more devices among the plurality of devices on the basis of the environment information.

~~A~~In an embodiment of the remote work support system ~~according to a thirteenth aspect is the system according to the eleventh aspect, in which,~~ the server manages progress of work performed by the site worker. The server calls at least one or more devices among the plurality of devices on the basis of the progress of the work.

~~A~~In an embodiment of the remote work support system ~~according to a fourteenth aspect is the system according to the eleventh aspect, in which,~~ the server performs voice recognition of an utterance of the site worker and an utterance of the support operator. The server calls at least one or more devices among the plurality of devices on the basis of a keyword acquired through the voice recognition.

~~A~~In an embodiment of the remote work support system ~~according to a fifteenth aspect is the system according to any of the eleventh aspect to the fourteenth aspect, in which,~~ the server further accepts, from the support operator terminal, designation of at least one or more devices

among the plurality of devices that are used by the site worker.

~~A~~In an embodiment of the remote work support system ~~according to a sixteenth aspect is the system according to any of the first aspect to the fifteenth aspect, in which,~~ the plurality of devices are capable of communicating with each other.

A support operator terminal according to a ~~seventeenth~~second aspect is to be used by a support operator who remotely supports a site worker. The support operator terminal includes a voice input unit, a voice output unit, and a display unit. The support operator terminal transmits and receives voice to and from a wearable device and receives an image from the wearable device. The wearable device is to be worn by the site worker and includes an image capturing unit, a voice input unit, and a voice output unit. The wearable device transmits an image and transmits and receives voice. The support operator terminal transmits an image to the mobile terminal. The mobile terminal is to be carried by the site worker separately from the wearable device. The mobile terminal includes a display unit that displays an image received by an image reception unit.

A server according to ~~an eighteentha~~ third aspect is a server to be connected to a plurality of devices. The plurality of devices include a wearable device, a mobile terminal, and a support operator terminal. The wearable device is to be worn by a site worker, includes an image capturing unit, a voice input unit, and a voice output unit, transmits an image, and transmits and receives voice. The mobile terminal is to be carried by the site worker separately from the wearable device and includes a display unit that displays an image received by an image reception unit. The support operator terminal is to be used by a support operator who remotely supports the site worker and includes a voice input unit, a voice output unit, and a display unit. The server designates at least one or more devices among the plurality of devices in accordance with a predetermined condition, and calls a communication target device in accordance with the designation.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a wearable device 10 according to a first embodiment.

Fig. 2 is an overall schematic diagram of a remote work support system 1 according to the first embodiment.

Fig. 3 is a diagram illustrating an example of a display screen on a display unit 43 of a