[0176] These computer program instructions may be loaded onto a computer or another programmable data processing device, so that a series of operations and steps are performed on the computer or the another programmable device, thereby generating computer-implemented processing. Therefore, the instructions executed on the computer or the another programmable device provide steps for implementing a specific function in one or more processes in the flowcharts and/or in one or more blocks in the block diagrams.

[0177] Although the embodiments of the present invention are described, persons skilled in the art can make changes and modifications to these embodiments once they learn the basic inventive concept. Therefore, the following claims are intended to be construed as to cover the embodiments and all changes and modifications falling within the scope of the present invention. It is clearly that persons skilled in the art can make various modifications and variations to the embodiments of the present invention without departing from the ~~spirit and~~ scope of the embodiments of the present invention. The present invention is intended to cover these modifications and variations provided that they fall within the scope of protection defined by the following claims and their equivalent technologies.

CLAIMS

What is claimed is:

1. An object modeling and movement method, wherein the method is applied to a mobile terminal, and the mobile terminal comprises a color camera and a depth camera; and the method comprises:

performing panoramic scanning on a target object by using the color camera and the depth camera, to obtain a 3D model of the target object;

obtaining a target movement manner; and

animating the 3D model of the target object in the target movement manner.

2. The method according to claim 1, wherein the depth camera comprises a TOF module or a structured light sensor module, and the color camera and the depth camera are located on one side of the mobile terminal.

3. The method according to claim 1 or 2, wherein after the obtaining a 3D model of the target object, the method further comprises:

obtaining a target skeletal model;

fusing the target skeletal model and the 3D model of the target object; and

before the animating the 3D model of the target object in the target movement manner, the method further comprises:

controlling the target skeletal model in the target movement manner.

4. The method according to any one of claims 1 to 3, wherein the obtaining a target skeletal model comprises:

receiving an operation instruction of a user, wherein the operation instruction is used to combine at least two line segments and at least one point into a skeletal model, wherein the line segment represents a skeleton in the skeletal model and the point represents a joint node in the skeletal model.

5. The method according to any one of claims 1 to 3, wherein the obtaining a target skeletal model comprises:

selecting, as the target skeletal model, a skeletal model with a highest degree of matching with a shape of the target object from at least one preset skeletal model.

6. The method according to any one of claims 1 to 5, wherein the obtaining a target movement

manner comprises:

obtaining a movement manner of a first object, and using the movement manner of the first object as the target movement manner.

7. The method according to any one of claims 1 to 5, wherein the obtaining a target movement manner comprises:

presenting at least two movement manners to the user, receiving a selection instruction of the user, and determining the target movement manner from the at least two movement manners; or

selecting, as the target movement manner, a movement manner with a highest attribute matching degree from a plurality of prestored movement manners based on an attribute of the target object.

8. The method according to any one of claims 1 to 5, wherein the obtaining a target movement manner comprises:

receiving animation made by the user for the skeletal model, and determining the animation as the target movement manner.

9. An object modeling and movement apparatus, wherein the apparatus is applied to a mobile terminal, and the mobile terminal comprises a color camera and a depth camera; and the apparatus includes:

a scanning module, configured to perform panoramic scanning on a target object by using the color camera and the depth camera, to obtain a 3D model of the target object;

a second obtaining module, configured to obtain a target movement manner; and

a movement module, configured to animate the 3D model of the target object in the target movement manner.

10. The apparatus according to claim 9, wherein the depth camera comprises a TOF module or a structured light sensor module, and the color camera and the depth camera are located on one side of the mobile terminal.

11. The apparatus according to claim 9 or 10, wherein the apparatus further comprises:

a first obtaining module, configured to obtain a target skeletal model; and

a fusion module, configured to fuse the target skeletal model and the 3D model of the target object; wherein

the movement module is further specifically configured to control the target skeletal model in the target movement manner.

12. The apparatus according to any one of claims 9 to 11, wherein the first obtaining module is specifically configured to:

receive an operation instruction of a user, wherein the operation instruction is used to combine at least two line segments and at least one point into a skeletal model, wherein the line segment represents a skeleton in the skeletal model and the point represents a joint node in the skeletal model;

select, as the target skeletal model, a skeletal model with a highest degree of matching with a shape of the target object from at least one preset skeletal model; or

obtain a movement manner of a first object, and use the movement manner of the first object as the target movement manner.

13. The apparatus according to any one of claims 9 to 12, wherein the second obtaining module is specifically configured to:

present at least two movement manners to the user, receive a selection instruction of the user, and determine the target movement manner from the at least two movement manners;

receive animation made by the user for the skeletal model, and determine the animation as the target movement manner; or

select, as the target movement manner, a movement manner with a highest attribute matching degree from a plurality of prestored movement manners based on the physical attribute of the target object.

14. A terminal device, wherein the terminal device comprises a memory, a processor, a bus, a depth camera, and a color camera; the color camera and the depth camera are located on one side of the mobile terminal; the memory, the depth camera, the color camera, and the processor are connected by using the bus; the depth camera and the color camera are configured to perform panoramic scanning on a target object under control of the processor; the memory is configured to store a computer program and an instruction; and the processor is configured to invoke the computer program and the instruction stored in the memory, to enable the terminal device to perform the method according to any one of claims 1 to 9.

15. The terminal device according to claim 14, wherein the terminal device further comprises an antenna system, and the antenna system sends and receives a wireless communication signal under control of the processor, to implement wireless communication with a mobile communications network, wherein the mobile communications network comprises one or more of

the following: a GSM network, a CDMA network, a 3G network, a 4G network, a 5G network, FDMA, TDMA, PDC, TACS, AMPS, WCDMA, TDSCDMA, Wi-Fi, and an LTE network.

16. An object modeling and movement method, wherein the method is applied to a mobile terminal, the mobile terminal comprises a color camera and a depth camera, the color camera and the depth camera are located on one side of the mobile terminal, and the depth camera comprises a TOF module or a structured light sensor module; and the method comprises:

performing panoramic scanning on a target object by using the color camera and the depth camera, to obtain a 3D model of the target object;

obtaining a target skeletal model;

fusing the target skeletal model and the 3D model of the target object;

obtaining a target movement manner; and

controlling the target skeletal model in the target movement manner, to animate the 3D model of the target object in the target movement manner.

17. The method according to claim 16, wherein the obtaining a target skeletal model comprises:

receiving an operation instruction of a user, wherein the operation instruction is used to combine at least two line segments and at least one point into a skeletal model, wherein the line segment represents a skeleton in the skeletal model and the point represents a joint node in the skeletal model; or

selecting, as the target skeletal model, a skeletal model with a highest degree of matching with a shape of the target object from at least one preset skeletal model.

18. The method according to claim 16 or 17, wherein the obtaining a target movement manner comprises:

obtaining a movement manner of a first object, and using the movement manner of the first object as the target movement manner;

presenting at least two movement manners to the user, receiving a selection instruction of the user, and determining the target movement manner from the at least two movement manners;

receiving animation made by the user for the skeletal model, and determining the animation as the target movement manner; or

selecting, as the target movement manner, a movement manner with a highest attribute matching degree from a plurality of prestored movement manners based on an attribute of the

target object.

19. An object modeling and movement apparatus, wherein the apparatus is applied to a mobile terminal, the mobile terminal comprises a color camera and a depth camera, the color camera and the depth camera are located on one side of the mobile terminal, and the depth camera comprises a TOF module or a structured light sensor module; and the apparatus comprises:

a scanning module, configured to perform panoramic scanning on a target object by using the color camera and the depth camera, to obtain a 3D model of the target object;

a first obtaining module, configured to obtain a target skeletal model;

a fusion module, configured to fuse the target skeletal model and the 3D model of the target object;

a second obtaining module, configured to obtain a target movement manner; and

a movement module, configured to control the target skeletal model in the target movement manner, to animate the 3D model of the target object in the target movement manner.

20. The apparatus according to claim 19, wherein

the first obtaining module is specifically configured to:

receive an operation instruction of a user, wherein the operation instruction is used to combine at least two line segments and at least one point into a skeletal model, wherein the line segment represents a skeleton in the skeletal model and the point represents a joint node in the skeletal model;

select, as the target skeletal model, a skeletal model with a highest degree of matching with a shape of the target object from at least one preset skeletal model; or

obtain a movement manner of a first object, and use the movement manner of the first object as the target movement manner; and

the second obtaining module is specifically configured to:

present at least two movement manners to the user, receive a selection instruction of the user, and determine the target movement manner from the at least two movement manners;

receive animation made by the user for the skeletal model, and determine the animation as the target movement manner; or

select, as the target movement manner, a movement manner with a highest attribute matching degree from a plurality of prestored movement manners based on the physical attribute of the target object.

CLAIMS

1. An object modeling and movement method, wherein the method is applied to a mobile terminal, the mobile terminal comprises a color camera and a depth camera, and the color camera and the depth camera are located on one side of the mobile terminal; and the method comprises:

performing panoramic scanning on a target object by using the color camera and the depth camera, to obtain a sequence of color images and a sequence of depth maps, wherein the scanning progress for the target object is presented on a display interface of the mobile terminal;

obtaining a 3D model of the target object based on the sequence of color images and the sequence of depth maps;

obtaining a current movement manner of a first object; and

animating the 3D model of the target object to move in the current movement manner of the first object.

2. The method according to claim 1, wherein the obtaining a current movement manner of a first object comprises:

capturing a real-time action of the first object; and

using a movement manner of the real-time action of the first object as the current movement manner of the first object.

3. The method according to claim 2, wherein the method further comprises:

when the 3D model of the target object moves in the current movement manner of the first object, using a captured image of the real-time action of the first object as a background of the movement of the target object.

4. The method according to any one of claims 1 to 3, wherein the target object is a static object, and the first object is a non-static object.

5. The method according to any one of claims 1 to 4, wherein the performing panoramic scanning on a target object by using the color camera and the depth camera comprises:

synchronously invoking the color camera and the depth camera to scan the target object, wherein a shooting frame rate of the color camera and a shooting frame rate of the depth camera are both greater than or equal to 25 fps.

6. The method according to any one of claims 1 to 5, wherein before the performing panoramic scanning on a target object by using the color camera and the depth camera, the method

further comprises:

displaying a preview image, wherein

an identifier in the preview image prompts whether the target object is suitable to be scanned.

7. The method according to any one of claims 1 to 6, wherein when the performing panoramic scanning on a target object by using the color camera and the depth camera, a user can select continuing or stopping the scanning.

8. The method according to any one of claims 1 to 7, wherein when the animating the 3D model of the target object to move in the current movement manner of the first object, the method further comprises:

displaying a shadow of the 3D model of the target object on the display interface, or adding a special effect to the 3D model of the target object.

9. The method according to any one of claims 1 to 8, wherein after the obtaining a 3D model of the target object, the method further comprises:

obtaining a target skeletal model; and

fusing the target skeletal model and the 3D model of the target object; and

the animating the 3D model of the target object to move in the current movement manner of the first object comprises:

controlling the target skeletal model to move in the current movement manner of the first object, to animate the 3D model, obtained through fusion, of the target object to move in the current movement manner of the first object.

10. The method according to any one of claims 1 to 9, wherein the obtaining a target skeletal model comprises:

receiving an operation instruction of a user, wherein the operation instruction is used to combine at least two line segments and at least one point into a skeletal model, wherein the line segment represents a skeleton in the skeletal model and the point represents a joint node in the skeletal model; or

obtaining a skeletal model that matches an outline of the target object, and using the skeletal model as the target skeletal model.

11. The method according to any one of claims 9 to 10, wherein the method further comprises:

performing a skinning operation on the target skeletal model and the 3D model of the target

object, wherein the skinning operation is used to determine a position change of a point on a surface of the 3D model of the target object based on movement of the target skeletal model, to enable the 3D model of the target object to move along with the target skeletal model.

12. The method according to any one of claims 1 to 11, wherein the method further comprises: locally storing the 3D mode in the mobile terminal.

13. The method according to any one of claims 1 to 12, wherein the method further comprises: playing the animation automatically by the mobile terminal, or by inputting an operation instruction by a user.

14. The method according to any one of claims 1 to 13, wherein a transmit power of infrared light in the depth camera is selected to range from 50 mw to 400 mw.

15. The method according to any one of claims 1 to 13, wherein a scanning distance for object scanning during the panoramic scanning ranges from 20 cm to 80 cm.

16. An object modeling and movement apparatus, wherein the apparatus is applied to a mobile terminal, the mobile terminal comprises a color camera and a depth camera, and the color camera and the depth camera are located on one side of the mobile terminal; and the apparatus comprises:

a scanning module, configured to perform panoramic scanning on a target object by using the color camera and the depth camera, to obtain a sequence of color images and a sequence of depth maps; and obtain a 3D model of the target object based on the sequence of color images and the sequence of depth maps, wherein the scanning progress for the target object is presented on a display interface of the mobile terminal;

a second obtaining module, configured to obtain a current movement manner of the first object; and

a movement module, configured to animate the 3D model of the target object to move in the current movement manner of the first object.

17. The apparatus according to claim 16, wherein the second obtaining module is specifically configured to:

capture a real-time action of the first object; and

use a movement manner of the real-time action of the first object as the current movement manner of the first object.

18. The apparatus according to claim 17, wherein the movement module is further configured

to:

when the 3D model of the target object moves in the current movement manner of the first object, use a captured image of the real-time action of the first object as a background of the movement of the target object.

19. The apparatus according to any one of claims 16 to 18, wherein the target object is a static object, and the first object is a non-static object.

20. The apparatus according to any one of claims 16 to 19, wherein the scanning module is further specifically configured to:

display a preview image, wherein

an identifier in the preview image prompts whether the target object is suitable to be scanned.

21. The apparatus according to any one of claims 16 to 20, wherein the movement module is further configured to:

display a shadow of the 3D model of the target object on a display interface of the mobile terminal, or add a special effect to the 3D model of the target object.

22. The apparatus according to any one of claims 16 to 21, the apparatus further comprises:

a first obtaining module, configured to obtain a target skeletal model;

a fusion module, configured to fuse the target skeletal model and the 3D model of the target object; wherein

the movement module is specifically configured to control the target skeletal model to move in the current movement manner of the first object, to animate the 3D model, obtained through fusion, of the target object to move in the current movement manner of the first object; and

the first obtaining module is specifically configured to:

receive an operation instruction of a user, wherein the operation instruction is used to combine at least two line segments and at least one point into a skeletal model, wherein the line segment represents a skeleton in the skeletal model and the point represents a joint node in the skeletal model; or

obtain a skeletal model that matches an outline of the target object, and use the skeletal model as the target skeletal model.

23. A terminal device, wherein the terminal device comprises a memory, a processor, a bus, a depth camera, and a color camera, wherein the color camera and the depth camera are located on

one side of the terminal device; the memory, the color camera, the depth camera, and the processor are connected by using the bus; the depth camera is configured to obtain a depth map, and the color camera is configured to obtain a color map; the memory is configured to store a computer program and an instruction; and the processor is configured to invoke the computer program and the instruction, to enable the terminal device to perform the method according to any one of claims 1 to 15.

24. The terminal device according to claim 23, wherein the terminal device further comprises an antenna system, and the antenna system sends and receives a wireless communication signal under control of the processor, to implement wireless communication with a mobile communications network, wherein the mobile communications network comprises one or more of the following: a GSM network, a CDMA network, a 3G network, a 4G network, a 5G network, FDMA, TDMA, PDC, TACS, AMPS, WCDMA, TDSCDMA, Wi-Fi, and an LTE network.