CLAIMS

What is claimed is:

1. An ability aiming method in a three-dimensional virtual environment, performed by a computer device, the method comprising:

displaying a user interface (UI) of an application program, the UI comprising a virtual environment picture and an ability aiming control, the virtual environment picture being a picture obtained by observing the three-dimensional virtual environment from the perspective of a third-person point of view, the ability aiming control being a two-dimensional control configured to cast an ability, and the ability aiming control being located on an upper layer of the virtual environment picture;

receiving a drag operation on the ability aiming control, the drag operation comprising a first operating point and a second operating point that are located on the ability aiming control, the first operating point being an initial operating point of the drag operation, and the second operating point being a current operating point of the drag operation; and

displaying a three-dimensional ability aiming indicator in the virtual environment picture in response to the drag operation, the three-dimensional ability aiming indicator being displayed on the ground of the three-dimensional virtual environment and configured to indicate an ability aiming direction and distance before a targeted ability is cast in the three-dimensional virtual environment, an ability aiming direction of the three-dimensional ability aiming indicator being displayed on the three-dimensional ability aiming indicator in the virtual environment picture, and being parallel to a drag direction of the drag operation in the UI, and the drag direction being a direction pointing from the first operating point to the second operating point.;

2. The method according to claim 1, wherein the displaying a three-dimensional ability aiming indicator in the virtual environment picture in response to the drag operation comprises:

determining, in response to the drag operation and according to anthe aiming vector pointing from the first operating point to the second operating point, an ability aiming vector of the three-dimensional ability aiming indicator in the three-dimensional virtual environment; and

displaying the three-dimensional ability aiming indicator according to the ability aiming vector.;

3. The method according to claim 2, wherein the determining, according to the aiming vector pointing from the first operating point to the second operating point, an ability aiming vector of the

three-dimensional ability aiming indicator in the three-dimensional virtual environment comprises:

~~determining the aiming vector pointing from the first operating point to the second operating point;~~

calculating, by using a center point on the UI as a first reference point, a pointed second reference point through adding~~after~~ the first reference point and the aiming vector ~~are added~~;

converting the first reference point into a third reference point in the three-dimensional virtual environment by using an inverse transformation matrix, and converting the second reference point into a fourth reference point in the three-dimensional virtual environment by using the inverse transformation matrix, wherein the inverse transformation matrix configured to convert a point on a two-dimensional coordinate system in which the virtual environment picture is located into a point on a casting platform of a virtual character in a three-dimensional coordinate system in which the three-dimensional virtual environment is located; and

determining a vector pointing from the third reference point to the fourth reference point as the ability aiming vector of the three-dimensional ability aiming indicator in the three-dimensional virtual environment.

4~~2~~. The method according to claim ~~2 or 3~~1, wherein the three-dimensional virtual environment comprises a controlled virtual character,

the ability aiming control comprises a maximum aiming distance~~, and~~;

the method further comprises: calculating~~there is~~ a first ratio of a first distance between the first operating point and the second operating point to the maximum aiming distance; ~~and~~

wherein the ability comprises a maximum ability distance in the three-dimensional virtual environment, the three-dimensional ability aiming indicator comprises a first aiming point and a second aiming point that are in the three-dimensional virtual environment, the first aiming point is an initial point during ability aiming, which is a position point of the virtual character in the three-dimensional virtual environment, the second aiming point is a target point to be determined during ability aiming, and there is a second ratio of a second distance between the first aiming point and the second aiming point to the maximum ability distance,

the first ratio and the second ratio being the same.

5~~3~~. The method according to claim 4~~2~~, wherein ~~the three-dimensional virtual environment comprises a controlled virtual character, and~~ the displaying the three-dimensional ability aiming indicator according to the ability aiming vector comprises:

determining a position point of the virtual character in the three-dimensional virtual environment as the first aiming point;

determining the second aiming point of the three-dimensional ability aiming indicator during ability aiming according to the first aiming point and the ability aiming vector; and

displaying the three-dimensional ability aiming indicator according to the first aiming point and the second aiming point.

~~6~~4. The method according to claim ~~5~~3, wherein the determining the second aiming point of the three-dimensional ability aiming indicator during ability aiming according to the first aiming point and the ability aiming vector comprises:

obtaining the maximum aiming distance of the ability aiming control; ~~calculating the first ratio of the first distance between the first operating point and the second operating point to the maximum aiming distance;~~

obtaining the maximum ability distance of the ability in the three-dimensional virtual environment; calculating a product of the first ratio and the maximum ability distance as a cast distance; and

~~adding~~determining, in a direction pointed by the aiming vector, ~~the first aiming point to the cast distance, to obtain~~ the second aiming point of the three-dimensional ability aiming indicator during ability aiming according to the first aiming point and the cast distance, the second aiming point is the target point that the virtual character casts toward a position starting from the first aiming point with the cast distance in the direction pointed by the aiming vector.

~~7~~5. The method according to claim 1, wherein the displaying a three-dimensional ability aiming indicator in the virtual environment picture in response to the drag operation comprises:

displaying the three-dimensional ability aiming indicator in the virtual environment picture in response to that a distance between the first operating point and the second operating point is greater than a dead region threshold, wherein the dead region is a region where the distance between the first operating point and the second operating point is less than a threshold, and ability aiming is not triggered.

~~8. An ability aiming method in a three-dimensional virtual environment, applicable to a computer device configured with or connected to a physical aiming component, the method comprising:~~

~~displaying a user interface (UI) of an application program, the UI comprising a virtual~~

~~environment picture, and the virtual environment picture being a picture obtained by observing the three-dimensional virtual environment from the perspective of a third-person point of view;~~

~~receiving an aiming operation on the physical aiming component, the aiming operation comprising a first operating position and a second operating position that are triggered on the physical aiming component, the first operating position being an initial operating position of the aiming operation, and the second operating position being a current operating position of the aiming operation; and~~

~~displaying a three-dimensional ability aiming indicator in the virtual environment picture in response to the aiming operation, an ability aiming direction of the three-dimensional ability aiming indicator being parallel to an aiming direction of the aiming operation in the UI, and the aiming direction being a direction pointing from the first operating position to the second operating position.~~

~~9~~6. An ability aiming apparatus in a three-dimensional virtual environment, applicable to a computer device, the apparatus comprising:

a display module, configured to display a user interface (UI) of an application program, the UI comprising a virtual environment picture and an ability aiming control, the virtual environment picture being a picture obtained by observing the three-dimensional virtual environment from the perspective of a third-person point of view, the ability aiming control being a two-dimensional control configured to cast an ability, and the ability aiming control being located on an upper layer of the virtual environment picture;

a receiving module, configured to receive a drag operation on the ability aiming control, the drag operation comprising a first operating point and a second operating point that are located on the ability aiming control, the first operating point being an initial operating point of the drag operation, and the second operating point being a current operating point of the drag operation; and

the display module being further configured to display a three-dimensional ability aiming indicator in the virtual environment picture in response to the drag operation, the three-dimensional ability aiming indicator being displayed on the ground of the three-dimensional virtual environment, and configured to indicate an ability aiming direction and distance before a targeted ability is cast in the three-dimensional virtual environment, an ability aiming direction of the three-dimensional ability aiming indicator being displayed on the three-dimensional ability aiming indicator in the virtual environment picture, and being parallel to a drag direction of the drag operation in the UI, and the drag direction being a direction pointing from the first operating point

to the second operating point.;

10. The apparatus according to claim 9, wherein the display module comprises a determining submodule and a display submodule;

the determining submodule is configured to determine, in response to the drag operation and according to the an aiming vector pointing from the first operating point to the second operating point, an ability aiming vector of the three-dimensional ability aiming indicator in the three-dimensional virtual environment; and

the display submodule is further configured to display the three-dimensional ability aiming indicator according to the ability aiming vector.;

11. The apparatus according to claim 10, wherein the determining sub-module comprises:

a determining subunit, configured to determine the aiming vector pointing from the first operating point to the second operating point;

a calculation subunit, configured to calculate, by using a center point on the UI as a first reference point, a pointed second reference point through addingafter the first reference point and the aiming vector are added;

a conversion subunit, configured to convert the first reference point into a third reference point in the three-dimensional virtual environment by using an inverse transformation matrix, and convert the second reference point into a fourth reference point in the three-dimensional virtual environment by using the inverse transformation matrix, the inverse transformation matrix configured to convert a point on a two-dimensional coordinate system in which the virtual environment picture is located into a point on a casting platform of a virtual character in a three-dimensional coordinate system in which the three-dimensional virtual environment is located; and

the determining subunit being further configured to determine a vector pointing from the third reference point to the fourth reference point as the ability aiming vector of the three-dimensional ability aiming indicator in the three-dimensional virtual environment.

127. The apparatus according to claim 10 or 116, wherein the three-dimensional virtual environment comprises a controlled virtual character,

the ability aiming control comprises a maximum aiming distance, and there is;

the display submodule is further configured to calculate a first ratio of a first distance between the first operating point and the second operating point to the maximum aiming distance; and

the ability comprises a maximum ability distance in the three-dimensional virtual environment,

the three-dimensional ability aiming indicator comprises a first aiming point and a second aiming point that are in the three-dimensional virtual environment, the first aiming point is an initial point during ability aiming, which is a position point of the virtual character in the three-dimensional virtual environment, the second aiming point is a target point to be determined during ability aiming, and there is a second ratio of a second distance between the first aiming point and the second aiming point to the maximum ability distance,

the first ratio and the second ratio being the same.

~~13~~8. The apparatus according to claim ~~12~~7, wherein ~~the three-dimensional virtual environment comprises a controlled virtual character, and~~ the display submodule is further configured to:

determine a position point of the virtual character in the three-dimensional virtual environment as the first aiming point;

determine the second aiming point of the three-dimensional ability aiming indicator during ability aiming according to the first aiming point and the ability aiming vector; and

display the three-dimensional ability aiming indicator according to the first aiming point and the second aiming point.

~~14~~9. The apparatus according to claim ~~13~~8, wherein the display submodule is further configured to:

obtain the maximum aiming distance of the ability aiming control; ~~calculate the first ratio of the first distance between the first operating point and the second operating point to the maximum aiming distance;~~

obtain the maximum ability distance of the ability in the three-dimensional virtual environment; calculate a product of the first ratio and the maximum ability distance as a cast distance; and

~~add~~determine, ~~in a direction pointed by the aiming vector, the first aiming point to the cast distance, to obtain~~ the second aiming point of the three-dimensional ability aiming indicator during ability aiming according to the first aiming point and the cast distance, the second aiming point is the target point that the virtual character casts toward a position starting from the first aiming point with the cast distance in the direction pointed by the aiming vector.

~~15~~10. The apparatus according to claim ~~9~~6, wherein

the display module is configured to display the three-dimensional ability aiming indicator in the virtual environment picture in response to that a distance between the first operating point and

the second operating point is greater than a dead region threshold, wherein the dead region is a region where the distance between the first operating point and the second operating point is less than a threshold, and ability aiming is not triggered.

~~16. An ability aiming apparatus in a three-dimensional virtual environment, configured with or connected to a physical aiming component, the apparatus comprising:~~

~~a display module, configured to display a user interface (UI) of an application program, the UI comprising a virtual environment picture, and the virtual environment picture being a picture obtained by observing the three-dimensional virtual environment from the perspective of a third-person point of view;~~

~~a receiving module, configured to receive an aiming operation on the physical aiming component, the aiming operation comprising a first operating position and a second operating position that are triggered on the physical aiming component, the first operating position being an initial operating position of the aiming operation, and the second operating position being a current operating position of the aiming operation; and~~

~~the display module being further configured to display a three-dimensional ability aiming indicator in the virtual environment picture in response to the aiming operation, an ability aiming direction of the three-dimensional ability aiming indicator being parallel to an aiming direction of the aiming operation in the UI, and the aiming direction being a direction pointing from the first operating position to the second operating position.~~

~~17~~11. A computer device, comprising a processor and a memory, the memory storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by the processor to implement the ability aiming method in a three-dimensional virtual environment according to any one of claims 1 to ~~7~~5.

~~18. A computer device, comprising a processor, a memory, and a physical aiming component, the memory storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by the processor to implement the ability aiming method in a three-dimensional virtual environment according to claim 8.~~

~~19~~12. A computer-readable storage medium, storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by a processor to implement the ability

aiming method in a three-dimensional virtual environment according to any one of claims 1 to ~~7~~5.

~~20. A computer-readable storage medium, storing at least one instruction, at least one program, a code set, or an instruction set, the at least one instruction, the at least one program, the code set, or the instruction set being loaded and executed by a processor to implement the ability aiming method in a three-dimensional virtual environment according to claim 8.~~