CLAIMS

What is claimed is:

1. A method for controlling movements of a virtual object, applied to a terminal, the method comprising:

displaying a target perspective picture of a target application, and superimposing a virtual joystick and a movable area of the virtual joystick on the target perspective picture;

activating the virtual joystick when a trigger operation corresponding to the virtual joystick is obtained;

obtaining a position change of a touch point from a first position at a first moment to a second position at a second moment~~adjusting a position of the virtual joystick in the movable area according to a position change of a touch point~~ when the virtual joystick is in an activated state, ~~the~~ and a position of the virtual joystick and a position of the touch point changing synchronously in real time when the touch point moves within an effective touch range, the effective touch range comprising and being larger than the movable area, wherein the position change comprises a horizontal coordinate variation and a vertical coordinate variation; ~~and~~

calculating an estimated position of the virtual joystick at the second moment according to the position change and a position of the virtual joystick at the first moment, wherein a horizontal coordinate of the estimated position is a sum of a horizontal coordinate of the position of the virtual joystick at the first moment and the horizontal coordinate variation, and a vertical coordinate of the estimated position is a sum of a vertical coordinate of the position of the virtual joystick at the first moment and the vertical coordinate variation;

in response to the estimated position being outside the movable area, calculating an actual position of the virtual joystick at the second moment according to the estimated position and the movable area; and

controlling a virtual object to move according to the actual position of the virtual joystick.

~~2. The method according to claim 1, wherein the adjusting the position of the virtual joystick in the movable area according to the position change of the touch point comprises:~~

~~obtaining the position change of the touch point from a first moment to a second moment;~~

~~calculating an estimated position of the virtual joystick at the second moment according to the position change and a position of the virtual joystick at the first moment; and~~

~~calculating an actual position of the virtual joystick at the second moment according to the estimated position and the movable area when the estimated position is outside the movable area.~~

~~3~~2. The method according to claim ~~2~~1, wherein the movable area is a circle; and

the calculating the actual position of the virtual joystick at the second moment according to the estimated position and the movable area comprises:

calculating coordinates of an intersection of a connecting line between the estimated position and the center of the movable area and an edge of the movable area; and

determining the coordinates of the intersection as the actual position of the virtual joystick at the second moment.

~~4~~3. The method according to claim ~~2~~1, wherein after the calculating the estimated position of the virtual joystick at the second moment according to the position change and the position of the virtual joystick at the first moment, the method further comprises:

determining the estimated position as the actual position of the virtual joystick at the second moment when the estimated position is in the movable area.

~~5~~4. The method according to any one of claims 1 to ~~4~~3, wherein the controlling the virtual object to move according to the actual position of the virtual joystick comprises:

calculating a direction and a distance of the virtual joystick relative to the center of the movable area according to the actual position of the virtual joystick;

determining a moving direction and a moving speed of the virtual object according to the direction and the distance; and

controlling the virtual object to move according to the moving direction and the moving speed.

~~6~~5. An apparatus for controlling movements of a virtual object, comprising:

a display module, configured to: display a target perspective picture of a target application, and superimpose a virtual joystick and a movable area of the virtual joystick on the target perspective picture;

an activating module, configured to activate the virtual joystick when a trigger operation corresponding to the virtual joystick is obtained;

a variation~~an adjustment module~~unit, configured to obtain a position change of a touch point from a first position at a first moment to a second position at a second moment~~adjust a position of the virtual joystick in the movable area according to a position change of a touch point~~ when the

virtual joystick is in an activated state, and a~~the~~ position of the virtual joystick and a position of the touch point changing synchronously in real time when the touch point moves within an effective touch range, the effective touch range comprising and being larger than the movable area, wherein the position change comprises a horizontal coordinate variation and a vertical coordinate variation;~~and~~

an estimated position calculation unit, configured to calculate an estimated position of the virtual joystick at the second moment according to the position change and a position of the virtual joystick at the first moment, wherein a horizontal coordinate of the estimated position is a sum of a horizontal coordinate of the position of the virtual joystick at the first moment and the horizontal coordinate variation, and a vertical coordinate of the estimated position is a sum of a vertical coordinate of the position of the virtual joystick at the first moment and the vertical coordinate variation;

an actual position calculation unit, configured to in response to the estimated position being outside the movable area, calculate an actual position of the virtual joystick at the second moment according to the estimated position and the movable area;

a control module, configured to control a virtual object to move according to the actual position of the virtual joystick.

~~7. The apparatus according to claim 6, wherein the adjustment module comprises:~~

~~a variation obtaining unit, configured to obtain the position change of the touch point from a first moment to a second moment;~~

~~an estimated position calculation unit, configured to calculate an estimated position of the virtual joystick at the second moment according to the position change and a position of the virtual joystick at the first moment; and~~

~~an actual position calculation unit, configured to calculate an actual position of the virtual joystick at the second moment according to the estimated position and the movable area when the estimated position is outside the movable area.~~

~~8~~6. The apparatus according to claim ~~7~~5, wherein the movable area is a circle; and

the actual position calculation unit is configured to:

calculate coordinates of an intersection of a connecting line between the estimated position and the center of the movable area and an edge of the movable area; and

determine the coordinates of the intersection as the actual position of the virtual joystick at the second moment.

~~9~~7. The apparatus according to claim ~~7~~5, further comprising:

a determining module, configured to determine the estimated position as the actual position of the virtual joystick at the second moment when the estimated position is in the movable area.

~~10~~8. The apparatus according to any one of claims ~~6~~ 5 to ~~9~~7, wherein the control module is configured to:

calculate a direction and a distance of the virtual joystick relative to the center of the movable area according to the actual position of the virtual joystick;

determine a moving direction and a moving speed of the virtual object according to the direction and the distance; and

control the virtual object to move according to the moving direction and the moving speed.

~~11~~9. A terminal, 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 method according to any one of claims 1 to ~~5~~4.

~~12~~10. 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 method according to any one of claims 1 to ~~5~~4.