CLAIMS

What is claimed is:

1. A computer-implemented method, comprising:

obtaining a target simulated component for testing performance of a biometric characteristic recognition device from a plurality of simulated components having one or more biometric characteristics, wherein the plurality of simulated components are constructed based on the one or more biometric characteristics of a predetermined body part of a target user;

controlling, based on a camera component arranged on a mechanical arm and in a target test environment having one or more test parameters, the mechanical arm to input biometric characteristic information of the target simulated component to the biometric characteristic recognition device, wherein the one or more test parameters comprise a light parameter in the target test environment, a pressing force parameter, and a pressing angle parameter of the mechanical arm for the target simulated component, wherein the camera component arranged on the mechanical arm obtains image information of the target simulated component and transmits the image information to an image processing system, the image processing system converts the image information into digital information, extracts characteristics of the target simulated component, and controls the mechanical arm to input the biometric characteristic information of the target simulated component to the biometric characteristic recognition device;

obtaining a recognition result from the biometric characteristic recognition device, the recognition result being generated by detecting the biometric characteristic information of the target simulated component based on predetermined reference biometric characteristic information; and

determining a performance test result of the biometric characteristic recognition device based on the recognition result.

~~2. The computer-implemented method of claim 1, wherein the one or more test parameters comprise at least one of the following: a light parameter in the target test environment, a pressing force parameter of the mechanical arm for the target simulated component, or a pressing angle parameter of the mechanical arm for the target simulated component.~~

~~3~~2. The computer-implemented method of claim 1, wherein the one or more biometric characteristics comprise one or more of fingerprint characteristics and palmprint characteristics.

~~4~~3. The computer-implemented method of claim ~~3~~2, wherein obtaining the target simulated component for testing the performance of the biometric characteristic recognition device from the plurality of simulated components having the one or more biometric characteristics comprises:

controlling, based on the camera component, the mechanical arm to select the target simulated component from the plurality of simulated components.

~~5~~4. The computer-implemented method of claim 1, wherein before obtaining the recognition result from the biometric characteristic recognition device, the computer-implemented method further comprises:

inputting biometric characteristic information of the plurality of simulated components to the biometric characteristic recognition device; and

using the biometric characteristic information of the plurality of simulated components as the predetermined reference biometric characteristic information.

~~6~~5. The computer-implemented method of claim ~~5~~4, further comprising:

obtaining biometric characteristic images of the predetermined body part of the target user;

constructing biometric characteristic test components based on the biometric characteristic images, wherein the biometric characteristic test components are configured to input the one or more biometric characteristics of the predetermined body part of the target user to the biometric characteristic recognition device;

controlling, based on the camera component and in the target test environment, the mechanical arm to input the one or more biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device;

obtaining a first recognition result from the biometric characteristic recognition device, the first recognition result being generated by detecting the one or more biometric characteristics in the biometric characteristic test components based on the predetermined reference biometric characteristic information; and

determining a safety test result of the biometric characteristic recognition device based on the first recognition result.

~~7~~6. The computer-implemented method of claim ~~6~~5, wherein controlling, based on the camera component and in the target test environment, the mechanical arm to input the one or more biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device comprises:

controlling the mechanical arm to place the biometric characteristic test components on the biometric characteristic recognition device based on the camera component;

obtaining position information of the biometric characteristic test components on the biometric characteristic recognition device based on the camera component;

detecting whether the biometric characteristic test components are placed on predetermined recognition regions of the biometric characteristics recognition device based on the position information;

when detecting that the biometric characteristic test components are not placed on the predetermined recognition regions of the biometric characteristics recognition device, controlling the mechanical arm to move the biometric characteristic test components to the predetermined recognition regions of the biometric characteristic recognition device based on the camera component; and

controlling the mechanical arm to operate the biometric characteristic test components to input the one or more biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device.

~~8~~7. A computer-implemented system, comprising:

one or more computers; and

one or more computer memory devices interoperably coupled with the one or more computers and having tangible, non-transitory, machine-readable media storing one or more instructions that, when executed by the one or more computers, perform one or more operations comprising:

obtaining a target simulated component for testing performance of a biometric characteristic recognition device from a plurality of simulated components having one or more

biometric characteristics, wherein the plurality of simulated components are constructed based on the one or more biometric characteristics of a predetermined body part of a target user;

controlling, based on a camera component arranged on a mechanical arm and in a target test environment having one or more test parameters, the mechanical arm to input biometric characteristic information of the target simulated component to the biometric characteristic recognition device, wherein the one or more test parameters comprise a light parameter in the target test environment, a pressing force parameter, and a pressing angle parameter of the mechanical arm for the target simulated component, wherein the camera component arranged on the mechanical arm obtains image information of the target simulated component and transmits the image information to an image processing system, the image processing system converts the image information into digital information, extracts characteristics of the target simulated component, and controls the mechanical arm to input the biometric characteristic information of the target simulated component to the biometric characteristic recognition device;

obtaining a recognition result from the biometric characteristic recognition device, the recognition result being generated by detecting the biometric characteristic information of the target simulated component based on predetermined reference biometric characteristic information; and

determining a performance test result of the biometric characteristic recognition device based on the recognition result.

~~9. The computer-implemented system of claim 8, wherein the one or more test parameters comprise at least one of the following: a light parameter in the target test environment, a pressing force parameter of the mechanical arm for the target simulated component, or a pressing angle parameter of the mechanical arm for the target simulated component.~~

~~10~~8. The computer-implemented system of claim ~~8~~7, wherein the one or more biometric characteristics comprise one or more of fingerprint characteristics and palmprint characteristics.

~~11~~9. The computer-implemented system of claim ~~10~~8, wherein obtaining the target simulated component for testing the performance of the biometric characteristic recognition device from the plurality of simulated components having the one or more biometric characteristics comprises:

controlling, based on the camera component, the mechanical arm to select the target simulated component from the plurality of simulated components.

~~12~~10. The computer-implemented system of claim ~~8~~7, wherein before obtaining the recognition result from the biometric characteristic recognition device, the one or more operations further comprise:

inputting biometric characteristic information of the plurality of simulated components to the biometric characteristic recognition device; and

using the biometric characteristic information of the plurality of simulated components as the predetermined reference biometric characteristic information.

~~13~~11. The computer-implemented system of claim ~~12~~10, wherein the one or more operations further comprise:

obtaining biometric characteristic images of the predetermined body part of the target user;

constructing biometric characteristic test components based on the biometric characteristic images, wherein the biometric characteristic test components are configured to input the one or more biometric characteristics of the predetermined body part of the target user to the biometric characteristic recognition device;

controlling, based on the camera component and in the target test environment, the mechanical arm to input the one or more biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device;

obtaining a first recognition result from the biometric characteristic recognition device, the first recognition result being generated by detecting the one or more biometric characteristics in the biometric characteristic test components based on the predetermined reference biometric characteristic information; and

determining a safety test result of the biometric characteristic recognition device based on the first recognition result.

~~14~~12. The computer-implemented system of claim ~~13~~11, wherein controlling, based on the camera component and in the target test environment, the mechanical arm to input the one or more

biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device comprises:

controlling the mechanical arm to place the biometric characteristic test components on the biometric characteristic recognition device based on the camera component;

obtaining position information of the biometric characteristic test components on the biometric characteristic recognition device based on the camera component;

detecting whether the biometric characteristic test components are placed on predetermined recognition regions of the biometric characteristics recognition device based on the position information;

when detecting that the biometric characteristic test components are not placed on the predetermined recognition regions of the biometric characteristics recognition device, controlling the mechanical arm to move the biometric characteristic test components to the predetermined recognition regions of the biometric characteristic recognition device based on the camera component; and

controlling the mechanical arm to operate the biometric characteristic test components to input the one or more biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device.

~~15~~13. A non-transitory, computer-readable medium storing one or more instructions executable by a computer system to perform operations comprising:

obtaining a target simulated component for testing performance of a biometric characteristic recognition device from a plurality of simulated components having one or more biometric characteristics, wherein the plurality of simulated components are constructed based on the one or more biometric characteristics of a predetermined body part of a target user;

controlling, based on a camera component arranged on a mechanical arm and in a target test environment having one or more test parameters, the mechanical arm to input biometric characteristic information of the target simulated component to the biometric characteristic recognition device, wherein the one or more test parameters comprise a light parameter in the target test environment, a pressing force parameter, and a pressing angle parameter of the mechanical arm for the target simulated component, wherein the camera component arranged on

the mechanical arm obtains image information of the target simulated component and transmits the image information to an image processing system, the image processing system converts the image information into digital information, extracts characteristics of the target simulated component, and controls the mechanical arm to input the biometric characteristic information of the target simulated component to the biometric characteristic recognition device;

obtaining a recognition result from the biometric characteristic recognition device, the recognition result being generated by detecting the biometric characteristic information of the target simulated component based on predetermined reference biometric characteristic information; and

determining a performance test result of the biometric characteristic recognition device based on the recognition result.

~~16. The non-transitory, computer-readable medium of claim 15, wherein the one or more test parameters comprise at least one of the following: a light parameter in the target test environment, a pressing force parameter of the mechanical arm for the target simulated component, or a pressing angle parameter of the mechanical arm for the target simulated component.~~

~~17~~14. The non-transitory, computer-readable medium of claim ~~15~~13, wherein the one or more biometric characteristics comprise one or more of fingerprint characteristics and palmprint characteristics.

~~18~~15. The non-transitory, computer-readable medium of claim ~~17~~14, wherein obtaining the target simulated component for testing the performance of the biometric characteristic recognition device from the plurality of simulated components having the one or more biometric characteristics comprises:

controlling, based on the camera component, the mechanical arm to select the target simulated component from the plurality of simulated components.

~~19~~16. The non-transitory, computer-readable medium of claim ~~15~~13, wherein before obtaining the recognition result from the biometric characteristic recognition device, the operations further comprise:

inputting biometric characteristic information of the plurality of simulated components to the biometric characteristic recognition device; and

using the biometric characteristic information of the plurality of simulated components as the predetermined reference biometric characteristic information.

~~20~~17. The non-transitory, computer-readable medium of claim ~~19~~16, wherein the operations further comprise:

obtaining biometric characteristic images of the predetermined body part of the target user;

constructing biometric characteristic test components based on the biometric characteristic images, wherein the biometric characteristic test components are configured to input the one or more biometric characteristics of the predetermined body part of the target user to the biometric characteristic recognition device;

controlling, based on the camera component and in the target test environment, the mechanical arm to input the one or more biometric characteristics of the predetermined body part of the target user from the biometric characteristic test components to the biometric characteristic recognition device;

obtaining a first recognition result from the biometric characteristic recognition device, the first recognition result being generated by detecting the one or more biometric characteristics in the biometric characteristic test components based on the predetermined reference biometric characteristic information; and

determining a safety test result of the biometric characteristic recognition device based on the first recognition result.