CLAIMS

What is claimed is:

1. A multimodal trajectory information processing and analysis system based on man-machine interaction terminal, comprising: a collection device and an information processing device;

wherein the collection device is configured to collect, analyze and process finger operation trajectory information comprising real-time operation interaction information, and send the collected finger operation trajectory information to the information processing device; and

the information processing device is configured to receive a display interface of a device under test in real time, and is configured to fuse and display the collected finger operation trajectory information corresponding to the display interface of the device under test, and obtain an evaluation system of man-machine interaction experience by analyzing finger operation trajectories,

wherein the multimodal trajectory information processing and analysis system further comprises: a bracket and a lifting device;

wherein the bracket is configured to place the device under test and support an upper limb of a tester;

the lifting device is connected to the bracket and is configured to adjust a location of the bracket; and

the collection device is fixedly arranged on the lifting device at an end away from the bracket.

2. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 1, wherein the operation interaction information at least comprises interaction locations, durations of the interaction locations and the number of the interaction locations.

3. The multimodal trajectory information processing and analysis system based on man-

machine interaction terminal according to claim 2, wherein the collection device comprises a touch sensor unit, and the touch sensor unit is located above the display interface of the device under test.

4. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 3, wherein the touch sensor unit is made of transparent plate material, and the touch sensor unit covers the display interface of the device under test.

5. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 3, wherein the touch sensor unit is a transparent film, and is closely attached to the display interface of the device under test.

6. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 2, wherein the collection device comprises an optical sensor unit, transmitting ends of the optical sensor unit are vertically arranged along two adjacent sides of the device under test, and receiving ends of the optical sensor are arranged along opposite two adjacent sides of the device under test.

7. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 6, wherein the transmitting ends of the optical sensor unit are configured to transmit optical signals, and the receiving ends of the optical sensor unit are configured to receive the optical signals transmitted by the transmitting ends; and

the optical sensor unit is configured to determine coordinates of blocked locations as coordinate points of finger operation interactions when the receiving ends are unable to receive the optical signals, and the optical sensor unit is further configured to monitor staying time of a finger at the coordinate points and the number of the finger operation interactions to obtain the operation interaction information.

8. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to in claim 7, wherein an optical signal arrangement of the optical sensor unit is arranged based on an M*N matrix, matrix arrangements of the transmitting ends and the receiving ends oppositely arranged of the optical sensor unit are the same, and optical signal arrangements of the optical sensor unit are arranged in one-to-one correspondence on opposite sides of the device under test.

9. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 1, further comprising: a distance measuring device and a controller;

wherein the distance measuring device is configured to detect a distance between the collection device and the device under test, and output a distance detection signal; and

the lifting device is connected to the controller and is configured to adjust the distance between the collection device and the device under test in response to receiving a control signal.

10. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 6, wherein the optical sensor unit comprises an infrared transceiver sensor.

11. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 10, wherein for collection of the interaction locations by the collection device, the collection device is configured to:

obtain a plurality of light intensity signals, wherein the light intensity signals are configured to reflect light intensity of infrared light received by any infrared receiver in a group of first receivers or any infrared receiver in a group of second receivers, and the first receivers and second receivers are infrared receivers arranged along two adjacent sides of the device under test;

determine a finger area based on a location of an infrared receiver with a weaker output light intensity signal and a location of an infrared transmitter that emits the infrared light; and

determine an effective finger area of the finger area to obtain interaction coordinate

information.

12. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 11, wherein for the determination of the finger area based on the location of the infrared receiver with the weaker output light intensity signal and the location of the infrared transmitter that emits the infrared light, the collection device is configured to:

determine a plurality of blocking paths based on the location of the infrared transmitter that emits the infrared light at each moment and the location of the infrared receiver with the weaker output light intensity signal; and

determine an overlapping area of the plurality of blocking paths and recording the overlapping area as the finger area.

13. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 12, wherein for the determination of the effective finger area in the finger area, the collection device is configured to:

determine whether an area of each finger area does not exceed 0.5 cm^2 and is not less than 0.01 cm^2; and

determine whether each finger area is quasi-circular;

wherein in response to the finger area simultaneously satisfying the above two conditions, the finger area is regarded as the interaction coordinate information.

14. The multimodal trajectory information processing and analysis system based on man-machine interaction terminal according to claim 13, wherein for the determination of whether each finger area is quasi-circular, the collection device is configured to:

obtain coordinate information of each point in the finger area;

determine a centroid coordinate of the finger area based on the coordinate information;

determine distances from the centroid coordinate to edges of the finger area based on the centroid coordinate and the coordinate information of each point in the finger area; and

calculate a variance value based on the distances from the centroid coordinate to the edges

of the finger area;

wherein in response to the variance value being less than or equal to a preset threshold, the finger area is quasi-circular; and

in response to the variance value being greater than the preset threshold, the finger area is non-quasi-circular.