Claims

1. A virtual reality (VR) system comprising:

a VR display for displaying a VR environment to a user;

memory comprising a digital twin corresponding to a physical object, the physical object comprising three or more landmarks having at least two states;

a detector;

a processor system, the memory storing instructions that, when executed by the processor system, cause the VR system to:

detect a location of each landmark using the detector;

match each landmark to a corresponding landmark on the digital twin using the processor system;

process, using the processor system, the corresponding landmarks to orient, position and scale the digital twin in the VR environment based on a position of the physical object; and

detect an action performed by the user on the physical object is detected and rendered in the VR environment on the digital twin, and when the action corresponds to a predetermined action, the VR system is configured to transition the object from a current said state to a next said state.

2. The VR system of claim 1, wherein the processor system processes the corresponding landmarks to orient, position and scale the digital twin in the VR environment by:

orienting the digital twin in accordance with an orientation of the physical object relative to the user; and

scaling the digital twin in accordance with a position of the user in a scenario displayed in the VR environment.

3. The VR system of claim 2, wherein scaling the digital twin in accordance with a position of the user in a scenario displayed in the VR environment

comprises down-sizing the object and placing the object perceptually further from the user in the VR environment when compared with a distance of the physical object from the user.

4. The VR system of claim 3, further comprising a controller for receiving position control commands, the VR display receiving a signal from the controller and teleporting the user to a new position in the VR environment in accordance with the signal, wherein the digital twin is resized based on the new position of the user.

5. The VR system of any one of claims 2 to 4, wherein the processor system orients and positions the digital twin by transforming the digital twin using Singular Vector Decomposition.

6. The VR system of any one of claims 1 to 5, wherein the processor system scales the digital twin using binary search.

7. A non-transitory computer-readable storage medium storing:

a digital twin corresponding to a physical object, the physical object comprising three or more landmarks; and

instructions that, when executed by a processor system of a virtual reality (VR) system, cause the VR system to:

detect a location of each landmark;

match each landmark to a corresponding landmark on the digital twin; and

process the corresponding landmarks to orient, position and scale the digital twin in a VR environment based on a position of the physical object.

8. An interactive object comprising:

a body configured to correspond to a digital twin in a virtual reality (VR) environment displayed to a user by a VR system;

a control module configured to control a state of the object, the object having at least two states;

wherein an action performed by the user on the object is detected and rendered in the VR environment on the digital twin, and when the action corresponds to a predetermined action, the control module is configured to transition the object from a current state to a next state.

9. The interactive object of claim 8, further comprising a transmitter and a sensor system, the sensor system detecting the action and sending a signal to the control module, and the control module sending a signal via the transmitter to the VR system if the action corresponds to the predetermined action.

10. The interactive object of claim 9, wherein the sensor system comprises at least one of:

a potentiometer for measuring a relative rotation between two or more portions of the body;

a pressure sensor for measuring pressure applied to a location on the body; and

a microphone on or in the body, for detecting one or more of speech from the user, sound from touch interaction between the user and body.

11. The interactive object of claim 9 or 10, wherein the control module or VR system is configured to combine the signal from the sensor system and actions of the user detected by the VR system, to detect performance of the predetermined action.

12. The interactive object of any one of claims 8 to 11, further comprising a receiver for receiving a control signal from the VR system, the control signal comprising at least one of a scenario and an object state, the

control module being configured to control the object in accordance with the control signal.

13. The interactive object of claim 8, wherein the control module is configured to implement a scenario to control the object, the scenario comprising:

a plurality of states including:

an initial state of the object; and

at least one further state of the object; and

a predetermined action for transitioning between states of the plurality of states,

wherein the control module is configured to control the state of the object in accordance with the scenario.

14. The object of any one of claims 8 to 13, further comprising a stimulus system, the stimulus system providing stimulus to the user during interaction between the user and the object.

15. The object of claim 14, wherein the stimulus system is controlled by the control module, to deliver the stimulus to the user in accordance with at least one of a state of the object and a scenario involving the object.

16. The object of claim 14 or 15, wherein the stimulus system comprises at least one of:

a haptic system to deliver a haptic stimulus to the user;

a speaker system to deliver a sound stimulus to the user;

an olfactory system to deliver an olfactory stimulus to the user; and

a thermal system to deliver a thermal stimulus to the user.

17. The object of claim 16, that replicates at least part of a living entity, and wherein the haptic system comprises a pulse generator for generating a pulse at a location of the living entity at which the user should test for the pulse.

18. A virtual reality (VR) system for interacting with one or more interactive objects according to any one of claims 8 to 17, comprising:

a VR display to display the VR environment to the user; and

at least one processor for changing content presented to the user in the VR environment in response to detection of the predetermined action.

19. The VR system of claim 18, wherein the change in content comprises a change in behaviour of the digital twin.

20. The VR system of claim 18 or 19, comprising:

memory comprising the digital twin corresponding to the physical object, the physical object comprising three or more landmarks;

a detector; and

a processor system, the memory storing instructions that, when executed by the processor system, cause the VR system to:

detect a location of each landmark using the detector;

match each landmark to a corresponding landmark on the digital twin using the processor system; and

process, using the processor system, the corresponding landmarks to orient, position and scale the digital twin in the VR environment based on a position of the physical object.