

Authentication and Transactions in a Three-Dimensional Image Enhancing Display Device

Cross-reference to related applications

[0001] This is the nonprovisional application for provisional application, serial number 62/080,039, filed on November 17, 2014, whose disclosure is incorporated by reference in its entirety herein. The present application is also related to a US nonprovisional application filed on November 17, 2015, application number (not yet available), whose disclosure is incorporated by reference in its entirety herein.

Field of Disclosure

[0002] The present disclosure relates to three dimensional environments, and more specifically, to authentication and transactions in a three dimensional image enhanced environment.

Background

[0003] As the world moves into using technology to augmented and virtual realities, new problems and opportunities are created. In terms of opportunities, users may be able to use technology to view images in more detail and with more information than was previously possible. In terms of problems, new versions of fraud and deceitful behavior are possible. Thus, it would be helpful to have a system that would leverage the three dimensional devices to provide additional security while present new opportunities for users and sponsors.

Summary

[0004] A method of determining whether a transaction is authorized in a three dimensional augmented reality is disclosed. The system may program a processor for receiving first image data from a first image sensor wherein the first image sensor is attached to a three-dimensional image enhancing device or a three dimensional visualization device and for receiving second image data from a second image sensor wherein the second image sensor is attached to the three-dimensional image enhancing device or the three dimensional visualization device. The first image data and the second image data may be communicated to the central computing device. The first image may be compared to a known first image and a similarity score may be determined. The second image may be compared to a known second image and a second similarity score may be determined. Transaction data related to a user of the three-dimensional image enhancing device or the three dimensional visualization device may be received. The similarity score and the second similarity score may be summed and if the sum of the similarity score and the second similarity score are over a threshold, authorizing the transaction.

[0005] According to a first aspect, there is provided a computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method including: receiving a first authentication data of the user from the three-dimensional image enhancing device, said first authentication data of the user comprising biometric data of the user; comparing the received first authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the three-dimensional image enhancing device; in response to the comparing, receiving a second authentication data of the user from the three-dimensional image enhancing device, said second authentication data of the user comprising images of a merchant, GPS location data of the user; audio data around the user, or audio data of the user; comparing the received second authentication data of the user to

the set of known authentication data of the user stored in the memory accessible by the three-dimensional image enhancing device; in response to the comparing, providing an object to the user for purchase from the merchant in the first reality environment via the three-dimensional image enhancing device; identifying an interaction of the user in a second reality environment to interact with the provided object in the first reality environment, said second reality environment being different and separate from the first reality environment; determining the identified interaction to complete the purchase transaction of the object; and completing the purchase transaction of the object in response to the determination being affirmative.

[0006] According to a second aspect, there is provided a computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method including: receiving at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said second reality environment being different from the first reality environment, said first authentication data of the user comprising biometric data of the user; transmitting the received at least one level of authentication data to a central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the central computing device and the three-dimensional image enhancing device; in response to receiving a confirmation from the central computing device, providing an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device; identifying an interaction of the user to interact with the provided object in the first reality environment; determining the identified interaction to complete the purchase transaction of the object; and completing the purchase transaction of the object in response to the determination being affirmative.

[0007] According to a third aspect, there is provided a system for facilitating a purchase transaction for a user in a first reality environment, said system including: a three-dimensional image enhancing device for providing the first reality environment to the user, wherein the user is sensory responsive to the first reality environment and a second reality environment, said second reality environment being different from the first reality environment; wherein the three-dimensional image enhancing device comprises a memory and a processor, said processor configured to execute computer-executable instructions; a central computing device accessible to a central memory via a network, said processor being accessible to the central computing device via the network; wherein the processor receives at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said first authentication data of the user comprising biometric data of the user; wherein the processor transmits the received at least one level of authentication data to the central computing device for comparing the received at least one level of authentication data of the user to a set of known

authentication data of the user stored in the central memory to validate the user; in response to the comparing, the central computing device transmits a confirmation to the processor; wherein the processor provides an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device; wherein the processor identifies an interaction of the user in the second reality environment to interact with the provided object in the first reality environment; wherein the processor determines the identified interaction to complete the purchase transaction of the object; and wherein the processor completes the purchase transaction of the object in response to the determination being affirmative.

[0007a] According to a fourth aspect, there is provided a computer readable medium storing computer-executable instructions configured to execute computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method including: receiving a first authentication data of the user from the three-dimensional image enhancing device, said first authentication data of the user comprising biometric data of the user; comparing the received first authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the three-dimensional image enhancing device; in response to the comparing, receiving a second authentication data of the user from the three-dimensional image enhancing device, said second authentication data of the user comprising images of a merchant, GPS location data of the user; audio data around the user, or audio data of the user; comparing the received second authentication data of the user to the set of known authentication data of the user stored in the memory accessible by the three-dimensional image enhancing device; in response to the comparing, providing an object to the user for purchase from the merchant in the first reality environment via the three-dimensional image enhancing device; identifying an interaction of the user in a second reality environment to interact with the provided object in the first reality environment, said second reality environment being different and separate from the first reality environment; determining the identified interaction to complete the purchase transaction of the object; and completing the purchase transaction of the object in response to the determination being affirmative.

[0007b] According to a fifth aspect, there is provided a computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method comprising: receiving at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said second reality environment being different from the first reality environment, said first authentication data of the user comprising biometric data of the user; transmitting the received at least one level of authentication data to a central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the central computing device and the three-dimensional image enhancing device; in response to receiving a confirmation from the central computing device, providing an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device; identifying an interaction of the user to interact with the provided object in the first reality environment; determining the identified

interaction to complete the purchase transaction of the object; and completing the purchase transaction of the object in response to the determination being affirmative.

[0007c] According to a sixth aspect, there is provided an apparatus for facilitating a purchase transaction for a user in a first reality environment, said apparatus comprising: a three-dimensional image enhancing device for providing the first reality environment to the user, wherein the user is sensory responsive to the first reality environment and a second reality environment, said second reality environment being different from the first reality environment; wherein the three-dimensional image enhancing device comprises a memory and a processor, said processor configured to execute computer-executable instructions; a central computing device accessible to a central memory via a network, said processor being accessible to the central computing device via the network; wherein the processor receives at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said first authentication data of the user comprising biometric data of the user; wherein the processor transmits the received at least one level of authentication data to the central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in the central memory to validate the user; in response to the comparing, the central computing device transmits a confirmation to the processor; wherein the processor provides an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device; wherein the processor identifies an interaction of the user in the second reality environment to interact with the provided object in the first reality environment; wherein the processor determines the identified interaction to complete the purchase transaction of the object; and wherein the processor completes the purchase transaction of the object in response to the determination being affirmative.

Brief Description of the Drawings

[0008] FIG. 1 may be an illustration of a three dimensional image enhancing device according to one embodiment of the invention;

[0009] FIG. 2 may illustrate a three dimensional image displayed to a non-authenticated user via the three dimensional image enhancing device according to one embodiment of the invention;

[00010] FIG. 3 may illustrate a three dimensional image displayed to an authenticated user via the three dimensional image enhancing device according to one embodiment of the invention;

[00011] FIG. 4A may illustrate a user reaching for an object in three dimensional space while using the three dimensional image enhancing device from the point of view of an outside observer according to one embodiment of the invention;

[00012] FIG. 4B may illustrate a three dimensional image displayed to an authenticated user while the user attempts to select goods and services in the three dimensional space according to one embodiment of the invention;

[00013] FIG. 5 illustrates an example routine or process flow diagram for authenticating financial transaction based on both authenticating a user and a particular location at which the transaction is attempting to be conducted according to one embodiment of the invention;

Claims

1. A computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method comprising:

receiving a first authentication data of the user from the three-dimensional image enhancing device, said first authentication data of the user comprising biometric data of the user;

comparing the received first authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the three-dimensional image enhancing device;

in response to the comparing, receiving a second authentication data of the user from the three-dimensional image enhancing device, said second authentication data of the user comprising images of a merchant, GPS location data of the user; audio data around the user, or audio data of the user;

comparing the received second authentication data of the user to the set of known authentication data of the user stored in the memory accessible by the three-dimensional image enhancing device;

in response to the comparing, providing an object to the user for purchase from the merchant in the first reality environment via the three-dimensional image enhancing device;

identifying an interaction of the user in a second reality environment to interact with the provided object in the first reality environment, said second reality environment being different and separate from the first reality environment;

determining the identified interaction to complete the purchase transaction of the object; and

completing the purchase transaction of the object in response to the determination being affirmative.

2. The computerized method of claim 1, wherein the first authentication data comprises data captured by sensors of the three-dimensional image enhancing device.

3. The computerized method as in any preceding claim, wherein the second authentication data comprises data captured outside the three-dimensional image enhancing device.
4. The computerized method as in any preceding claim, wherein providing the object to the user for purchase comprises providing the object based on a set of preferences of the user.
5. The computerized method as in any preceding claim, wherein providing the object for purchase comprises selectively providing the object in the first reality environment via the three-dimensional image enhancing device in response to receiving authentication data of a merchant, wherein the object comprises goods or services provided by the merchant.
6. The computerized method as in any preceding claim, further comprising receiving authentication data of the object before providing the object for purchase.
7. The computerized method as in any preceding claim, further comprising:
 - receiving geo-fenced area data indicating a specific geo-fence area within the second reality environment;
 - receiving another indication of movements from the user, the movements indicating the desire to change a spatial position of the user within the second reality environment;
 - determining authentication rights of the user for the received geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and
 - providing an object or a change to a background in the first reality environment via the three-dimensional image enhancing device.

8. The computerized method as in any preceding claim, wherein the first authentication data and the second authorization data comprise the first authentication data and the second authorization data associated with the user wearing the three-dimensional image enhancing device.

9. The computerized method as in any preceding claim, further comprising:

- receiving virtual geo-fenced area data indicating a specific geo-fence area within the first reality environment;

- receiving an indication of movements from the user, the movement indicating the desire to change a spatial position of the user within the first reality environment;

- determining authentication rights of the user for the received virtual geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

- providing via the three-dimensional image enhancing device a notification to the user that the virtual geo-fenced area is authenticated for the user.

10. The computerized method of claim 9, further comprising selectively providing settings in the first reality environment via the three-dimensional image enhancing device in response to the determined authentication rights.

11. A computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method comprising:

- receiving at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said

second reality environment being different from the first reality environment, said first authentication data of the user comprising biometric data of the user;

transmitting the received at least one level of authentication data to a central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the central computing device and the three-dimensional image enhancing device;

in response to receiving a confirmation from the central computing device, providing an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device;

identifying an interaction of the user to interact with the provided object in the first reality environment;

determining the identified interaction to complete the purchase transaction of the object; and

completing the purchase transaction of the object in response to the determination being affirmative.

12. The computerized method of claim 11, wherein identifying comprises identifying the moments of an external device engaged with the user, said external device being configured to control a cursor visible in the first reality environment via the three-dimensional image enhancing device.

13. The computerized method as in any preceding claim, wherein determining the identified interaction to complete the purchase transaction comprises comparing the interaction to a signature of the user stored in the memory.

14. The computerized method as in any preceding claim, wherein providing the object to the user for purchase comprises providing the object based on a set of preferences of the user.

15. The computerized method as in any preceding claim, wherein providing the object for purchase comprises selectively providing the object in the first reality environment

via the three-dimensional image enhancing device in response to receiving authentication data of a merchant, wherein the object comprises goods or services provided by the merchant.

16. The computerized method of claim 15, further comprising receiving authentication data of the object before providing the object for purchase.

17. A system for facilitating a purchase transaction for a user in a first reality environment, said system comprising:

- a three-dimensional image enhancing device for providing the first reality environment to the user, wherein the user is sensory responsive to the first reality environment and a second reality environment, said second reality environment being different from the first reality environment;

- wherein the three-dimensional image enhancing device comprises a memory and a processor, said processor configured to execute computer-executable instructions;

- a central computing device accessible to a central memory via a network, said processor being accessible to the central computing device via the network;

- wherein the processor receives at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said first authentication data of the user comprising biometric data of the user;

- wherein the processor transmits the received at least one level of authentication data to the central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in the central memory to validate the user;

in response to the comparing, the central computing device transmits a confirmation to the processor;

wherein the processor provides an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device;

wherein the processor identifies an interaction of the user in the second reality environment to interact with the provided object in the first reality environment;

wherein the processor determines the identified interaction to complete the purchase transaction of the object; and

wherein the processor completes the purchase transaction of the object in response to the determination being affirmative.

18. The system of claim 17, wherein the processor is further configured to execute computer-executable instructions for:

receiving virtual geo-fenced area data indicating a specific geo-fence area within the first reality environment;

receiving an indication of movements from the user, the movement indicating the desire to change a spatial position of the user within the first reality environment;

determining authentication rights of the user for the received virtual geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

providing via the three-dimensional image enhancing device a notification to the user that the virtual geo-fenced area is authenticated for the user.

19. The system of claim 17, wherein the processor is further configured to execute computer-executable instructions for:

receiving geo-fenced area data indicating a specific geo-fence area within the second reality environment;

receiving another indication of movements from the user, the movements indicating the desire to change a spatial position of the user within the second reality environment;

determining authentication rights of the user for the received geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

providing an object or a change to a background in the first reality environment via the three-dimensional image enhancing device.

20. The system as in any preceding claim, wherein the processor selectively provides settings in the first reality environment via the three-dimensional image enhancing device in response to the determined authentication rights.

21. A computer readable medium storing computer-executable instructions configured to execute computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method comprising:

receiving a first authentication data of the user from the three-dimensional image enhancing device, said first authentication data of the user comprising biometric data of the user;

comparing the received first authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the three-dimensional image enhancing device;

in response to the comparing, receiving a second authentication data of the user from the three-dimensional image enhancing device, said second authentication data of the user comprising images of a merchant, GPS location data of the user; audio data around the user, or audio data of the user;

comparing the received second authentication data of the user to the set of known authentication data of the user stored in the memory accessible by the three-dimensional image enhancing device;

in response to the comparing, providing an object to the user for purchase from the merchant in the first reality environment via the three-dimensional image enhancing device;

identifying an interaction of the user in a second reality environment to interact with the provided object in the first reality environment, said second reality environment being different and separate from the first reality environment;

determining the identified interaction to complete the purchase transaction of the object; and

completing the purchase transaction of the object in response to the determination being affirmative.

22. The computer readable medium of claim 21, wherein the first authentication data comprises data captured by sensors of the three-dimensional image enhancing device.

23. The computer readable medium of claim 21, wherein the second authentication data comprises data captured outside the three-dimensional image enhancing device.

24. The computer readable medium of claim 21, wherein providing the object to the user for purchase comprises providing the object based on a set of preferences of the user.

25. The computer readable medium of claim 21, wherein providing the object for purchase comprises selectively providing the object in the first reality environment via the three-dimensional image enhancing device in response to receiving authentication data of a merchant, wherein the object comprises goods or services provided by the merchant.

26. The computer readable medium of claim 25, further comprising receiving authentication data of the object before providing the object for purchase.

27. The computer readable medium of claim 21, further comprising:
receiving virtual geo-fenced area data indicating a specific geo-fence area within the first reality environment;

receiving an indication of movements from the user, the movement indicating the desire to change a spatial position of the user within the first reality environment;

determining authentication rights of the user for the received virtual geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

providing via the three-dimensional image enhancing device a notification to the user that the virtual geo-fenced area is authenticated for the user.

28. The computer readable medium of claim 27, further comprising selectively providing settings in the first reality environment via the three-dimensional image enhancing device in response to the determined authentication rights.

29. The computer readable medium of claim 21, further comprising:

receiving geo-fenced area data indicating a specific geo-fence area within the second reality environment;

receiving another indication of movements from the user, the movements indicating the desire to change a spatial position of the user within the second reality environment;

determining authentication rights of the user for the received geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

providing an object or a change to a background in the first reality environment via the three-dimensional image enhancing device.

30. The computer readable medium of claim 21, wherein the first authentication data and the second authorization data comprise the first authentication data and the second authorization data associated with the user wearing the three-dimensional image enhancing device.

31. A computerized method for facilitating a purchase transaction for a user in a first reality environment, said first reality environment being provided to the user via a three-dimensional image enhancing device, said computerized method comprising:

receiving at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-based data from the second reality environment and a combination of sound data and image data, said second reality environment being different from the first reality environment, said first authentication data of the user comprising biometric data of the user;

transmitting the received at least one level of authentication data to a central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in a memory accessible by the central computing device and the three-dimensional image enhancing device;

in response to receiving a confirmation from the central computing device, providing an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device;

identifying an interaction of the user to interact with the provided object in the first reality environment;

determining the identified interaction to complete the purchase transaction of the object; and

completing the purchase transaction of the object in response to the determination being affirmative.

32. The computerized method of claim 31, wherein identifying comprises identifying the moments of an external device engaged with the user, said external device being configured to control a cursor visible in the first reality environment via the three-dimensional image enhancing device.

33. The computerized method of claim 31, wherein determining the identified interaction to complete the purchase transaction comprises comparing the interaction to a signature of the user stored in the memory.

34. The computerized method of claim 31, wherein providing the object to the user for purchase comprises providing the object based on a set of preferences of the user.

35. The computerized method of claim 31, wherein providing the object for purchase comprises selectively providing the object in the first reality environment via the three-dimensional image enhancing device in response to receiving authentication data of a merchant, wherein the object comprises goods or services provided by the merchant.

36. The computerized method of claim 35, further comprising receiving authentication data of the object before providing the object for purchase.

37. An apparatus for facilitating a purchase transaction for a user in a first reality environment, said apparatus comprising:

- a three-dimensional image enhancing device for providing the first reality environment to the user, wherein the user is sensory responsive to the first reality environment and a second reality environment, said second reality environment being different from the first reality environment;

- wherein the three-dimensional image enhancing device comprises a memory and a processor, said processor configured to execute computer-executable instructions;

- a central computing device accessible to a central memory via a network, said processor being accessible to the central computing device via the network;

- wherein the processor receives at least one level of authentication data of the user from the three-dimensional image enhancing device, said at least one level of authentication data comprising at least one of the following: image data of a first authentication data of the user obtained via the three-dimensional image enhancing device, a second authentication data relating to a merchant, including audio data from a second reality environment, visual data from the second reality environment, location-

based data from the second reality environment and a combination of sound data and image data, said first authentication data of the user comprising biometric data of the user;

wherein the processor transmits the received at least one level of authentication data to the central computing device for comparing the received at least one level of authentication data of the user to a set of known authentication data of the user stored in the central memory to validate the user;

in response to the comparing, the central computing device transmits a confirmation to the processor;

wherein the processor provides an object to the user for purchase in the first reality environment via the three-dimensional image enhancing device;

wherein the processor identifies an interaction of the user in the second reality environment to interact with the provided object in the first reality environment;

wherein the processor determines the identified interaction to complete the purchase transaction of the object; and

wherein the processor completes the purchase transaction of the object in response to the determination being affirmative.

38. The apparatus of claim 37, wherein the processor is further configured to execute computer-executable instructions for:

receiving virtual geo-fenced area data indicating a specific geo-fence area within the first reality environment;

receiving an indication of movements from the user, the movement indicating the desire to change a spatial position of the user within the first reality environment;

determining authentication rights of the user for the received virtual geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

providing via the three-dimensional image enhancing device a notification to the user that the virtual geo-fenced area is authenticated for the user.

39. The apparatus of claim 38, wherein the processor selectively provides settings in the first reality environment via the three-dimensional image enhancing device in response to the determined authentication rights.

40. The apparatus of claim 37, wherein the processor is further configured to execute computer-executable instructions for:

- receiving geo-fenced area data indicating a specific geo-fence area within the second reality environment;

- receiving another indication of movements from the user, the movements indicating the desire to change a spatial position of the user within the second reality environment;

- determining authentication rights of the user for the received geo-fenced area based on the comparing of the first authentication data and the second authentication data to the known authentication data of the user; and

- providing an object or a change to a background in the first reality environment via the three-dimensional image enhancing device.