CONTAINER-BASED VIRTUAL CAMERA ROTATION

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of U.S. Provisional Application No. 62/489,904, filed Apr. 25, 2017, the entirety of which is incorporated by reference herein.

BACKGROUND

[0001] Publishing sites have been a key way to share and consume information on the web. A handful of services exist that democratize web site creation. However, services do not exist to solve the problem of creating sites that realize the full potential of 3D content. With an increasing push to create easy 3D content, there is a need for tools and/or services to facilitate the consumption of the 3D content. For instance, moving within a virtual world through the use a virtual reality device is often challenging. In some cases, users may not understand how to utilize or interact with the virtual world. Further, automatically moving the user through the virtual world can be difficult to accomplish and may cause discomfort or motion sickness of the user.

[0002] It is with respect to these and other general considerations that embodiments have been described. Also, although relatively specific problems have been discussed, it should be understood that the embodiments should not be limited to solving the specific problems identified in the background.

SUMMARY

[0003] The present technology relates to controlling a user's view in a virtual world, such as a virtual 3D space. For example, a user may be wearing a head-mounted display (HMD) that provides a virtual reality view of the virtual world. While the user is viewing the virtual world through the HMD, the user may wish to interact with objects in the virtual world. To facilitate interactions with the virtual world, the present technology alters the user's view by associating, or wrapping, the virtual camera in a container. The virtual camera and the container are associated in such a manner that changes to the orientation of the container cause a change in orientation of the virtual camera. As such, by controlling the orientation of the container, a program can control the view experienced by the user. The present technology also accounts for the rotation of a user's head while wearing the device, such that a final view is the view desired by a program presenting the virtual world. For instance, the technology may determine a rotation angle of th' virtual camera prior to 1otateng the container to a new desired view. The technology then adjusts the amount of rotation for the container based on the determined rotation angle of the virtual camera. By compensating for the virtual camera rotation angle, which is controlled by the orientation of the user's head, the final view of the user is in the direction originally desired by the program.

[0004] This summary is provided to introduce a selection of concepts in a simplified form

new view, and adjusts the amount of rotation for the container based on the determined rotation angle of the virtual camera. By compensating for the virtual camera rotation angle, which is controlled by the orientation of the user's head, the final view of the user is in the direction originally desired by the program.

[0020] Figure 1 depicts an example of a head-mounted display system ("HMD") 110 having a display source 102 according to an example of the present technology. The HMD 110 may be worn by a user 106 to provide content to the user 106 through the display source 102, such as virtual reality content or augmented reality content. In the example of providing augmented reality content, the front surface of HMD 110 may incorporate one or more cameras to allow an augmented video stream to be presented to the user 106 through the display source 102, which may be referred to as video augmented reality. The HMD 110 may also include integrated computing components to provide content as a stand-alone system. The HMD 110 may also include wireless or wired connectivity features to receive content from other computing devices, such as mobile phones, tablets, laptops, desktops, and the like. The display source 102 may be affixed towards the front of the HMD 110 using any means known to those having skill in the art. In some examples, the HMD 110 includes multiple display sources 102. For instance, the HMD 110 may include a display source 102 for each eye. In other examples, the display source 102 may be a smartphone or other similar device. The display source 102 may also include, or be displaced proximate to, lenses that allow for the user to more clearly see the images displayed on the display source. Other example HMD's that may be suitable for use with the present technology are described in U.S. Patent Publication No. 2016/0027213, which is incorporated herein by reference in its entirety.

[0021] Figure 2A depicts an example view within a virtual world illustrating a locomotion marker. To help a user navigate a virtual world, one or more selectable locomotion markers may be placed within the virtual world that identify placement locations for a user within the virtual world. In some examples, the locomotion markers may be displayed within the virtual world when a user's view, or gaze, is positioned within or directed to a predetermined area around the locomotion marker. In further examples, in addition to identifying locations that the user can move through the 3D space, the locomotion marker may provide an indication of a default direction of the user's view upon moving to the 3D space. For example, users may traverse a virtual world by teleporting from one location to another. Upon teleporting to a new space, a user may become disoriented. The indication of the user's view may provide context to the user that allows the user to better understand the user's orientation within the virtual world after teleportation. As an example, a user