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Mechanism for Displaying Three-Dimensional Objects Alongside Video in Virtual Reality

Virtual reality content is typically displayed via stereoscopic images to displays positioned in front of each eye of a user. The paired stereoscopic images, generated with real or virtual cameras at slight displacements, provide an immersive three-dimensional (3D) environment. Virtual reality content may include video games, movies or television shows, interactive environments, applications, or any other type and form of content.

Developers creating virtual reality content are limited in the number of options that they can use to monetize their content. Developers are also limited in the types of experiences they can provide their users while watching video. In a 3D and immersive environment, two-dimensional (2D) banner ads may not be as effective as in a 2D environment. For example, in a 3D environment, a 2D banner may not take advantage of the volumetric space provided by the virtual 3D environment. They may break the user's sense of immersion and make it difficult to focus on the 3D scene. At best, the 2D banner may appear as a floating 2D poster or frame within the 3D environment, which may be acceptable in some implementations and for some content (e.g. within a virtual reality game in which floating windows are expected), but may not be acceptable in other implementations or content (e.g. a 360-degree movie or television program based in a real world environment in which floating windows are not expected). In either of such implementations, banner ads may not be interesting to users who are expecting to see a virtual world of items, reducing conversion rates.

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Instead, the systems and methods described herein provide for displaying 3D objects alongside video or other content within a virtual reality environment. The user can see the video but can also see an object next to the video. The user may be able to interact with that object. The object may or may not be related to the video. The object could be placed anywhere in the scene in relation to the video. Showing users in virtual reality a sponsored 3D object has many advantages over showing a 2D banner. In addition to addressing the problems discussed above, the 3D object may also provide advantages over 2D advertising of content within a 2D environment:

• Unlike 2D banners or similar content, the 3D object can perform actions within the 3D environment, such as moving around the environment; transforming in scale, rotation, and/or object type or form; and displaying more information than possible with a 2D object without cycling through images or text.

• The 3D object is more visually interesting to users than 2D images and has properties which can be seen and examined by the user. For example, a user may move around the 3D object to see information on other sides, or physically interact with the 3D object to rotate it to view other information. As virtual reality and virtual environments are still relatively new and exciting, users may enjoy interacting with content of the 3D object more than they would for the same content in a 2D environment such as a web browser.

• The 3D object can be animated or allow interaction in new and interesting ways. For example, users may interact with the object by gazing at it, tapping it, or other interaction mechanisms. After interacting, a variety of things could happen: the user

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could be redirected to a website; could be redirected to an application vendor (e.g. Android Play Store or similar online store); execute another virtual reality application or routine, such as a user interface to allow completion of another action (e.g. purchase a product or initiate download of data or applications); or any other type and form of action. In some implementations, the interaction may generate an item or identifier in a queue for executing a subsequent action, such as after the user finishes with the present virtual environment or content.

For example, in one such implementation, a user may launch or enter a 3D virtual environment to watch a video. During the video, the user may see a virtual object appearing to be a pizza box or similar object beside the video. The user may interact with the pizza box (e.g. by looking at it, touching it with a virtual controller, etc.). The box may open to reveal a new type of pizza, a coupon code, a user interface for ordering pizza, or any other such information. Upon completion of interaction, the pizza box may close or the user may take other actions with the object.

In another such implementation, a user may launch or enter a 3D virtual environment to watch a video. The user may see a soccer ball beside the video, and may trigger the soccer ball by interacting with it (e.g. by looking at it, touching it with a virtual controller, etc.). The ball may perform animated actions (e.g. bouncing), and the user can make further interactions with it (e.g. heading the ball into a goal). After interaction is complete, the user may return to the video or may continue to a website about soccer.
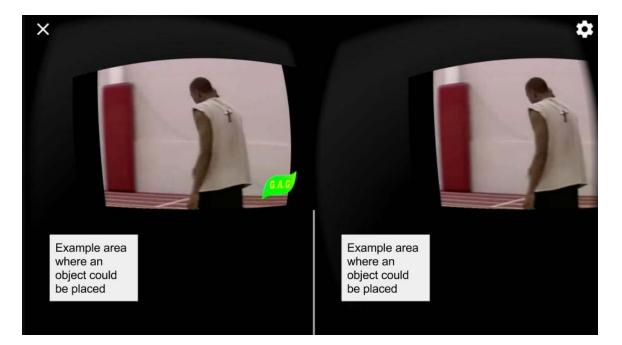
FIG. 1: Example stereoscopic image

FIG. 1 illustrates an example of a stereoscopic image viewed within the displays of a virtual reality headset. The image may be split in half at the vertical white line, with each half provided to each eye of the user. Objects appearing in the 3D environment may appear in both halves of the stereoscopic image, at positional offsets proportional to their distance in the Z-axis from the user or camera position.

As shown, a video may appear within a virtual screen in front of the user. If the video is not a 360 degree video or video surrounding the user, then additional space around the virtual screen may be present where a 3D object may be placed. In typical implementations, significant space may exist around the user in the 3D environment where such objects could be placed, including above the user, below the user, and behind the user, as well as in locations closer to the virtual screen. As the environment is 3D, in some implementations, virtual objects may be placed in front of or behind the virtual screen. For example, a user may watch a movie on a virtual giant movie screen within

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the 3D environment (for example, at a size not possible for home viewing, such as having a private virtual movie theater with a hundred-foot screen); and may lean or walk forward to look "through" the screen to view objects placed behind the screen.

Thus, by placing an object within the environment, the user may look around the scene within the virtual reality environment and "discover" something new, potentially drawing greater numbers of interactions and interested users than static 2D banners or similar content.

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<u>Abstract</u>

The systems and methods described herein provide for displaying 3D objects alongside video or other content within a virtual reality environment. The user can see the video but can also see an object next to, behind, above, below, or positioned elsewhere in relation to the video. The user may be able to interact with that object. The object may or may not be related to the video. The object could be placed anywhere in the scene in relation to the video.