Personal Boundaries In Virtual Reality

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ABSTRACT

In social virtual reality (VR) environments, it is possible for a participant’s VR avatar to get very close to another participant. In case of such an event, the second participant can feel like they don't have control over their personal space in the VR environment. If the intruding participant is a stranger (rather than a friend or family member), the experience is all the more uncomfortable. It is possible for intrusions of personal virtual space to extend to unwanted touching and other forms of physical abuse which can later be claimed as or mistaken for acceptable behavior. This disclosure describes techniques that enable a VR user to create a personal boundary around their avatar that keeps other people’s avatars a comfortable distance away, and does so in a way that normalizes respect for personal space in virtual environments.

KEYWORDS

- Virtual reality (VR)
- Avatar
- Personal boundary
- VR game
- Personal space
- Personal-space violation

BACKGROUND

In social virtual reality (VR) environments, it is possible for a participant’s VR avatar to get very close to another participant. In case of such an event, the second participant can feel like they don't have control over their personal space in the VR environment. If the intruding participant is a stranger (rather than a friend or family member), the experience is all the more
uncomfortable. It is possible for intrusions of personal virtual space to extend to unwanted touching and other forms of physical abuse which can later be claimed as or mistaken for acceptable behavior.

**DESCRIPTION**

This disclosure describes techniques that enable a user to create a personal boundary around their avatar in a virtual reality environment. The personal boundary is enforced by the virtual reality platform such that other avatars are kept a comfortable distance away. The enforcement of a personal boundary normalizes respect for personal space in virtual environments.

**Fig. 1:** A virtual reality control panel to enable a user to create and adjust a personal boundary

Fig. 1 illustrates an example user interface in a virtual reality environment that a user can utilize to enforce and adjust a personal boundary. When in virtual reality, the user can simply summon, e.g., by the flick of a finger, a virtual control panel. The user can then activate the
personal boundary by selecting the safety button, e.g., shield icon, on the control panel to set up and adjust the extent of their personal boundary. The virtual control panel or other personal user interface and the associated safety buttons cannot be blocked or made invisible by users of the VR environment.

Fig. 2(a) illustrates an example visual indicator of the establishment of a personal boundary, per the techniques of this disclosure. As seen in Fig. 2, a green band, with a radius set by the user, can appear around the avatar of the user. To avoid distracting users and to avoid computationally expensive visual effects, the band is generally invisible, but it is always active so long as the user keeps the personal boundary on.

For example, the boundary outline can be made visible only upon an intrusion or during set-up. Fig. 2(b) illustrates the enforcement of personal boundaries. A second avatar (illustrated as a red band) attempts entry into the personal space (green band) of the first avatar. The second
avatar is automatically, e.g., by the rules of VR engagement, pushed away from the first user such that no portion of the second avatar is within the defined personal boundary.

Fig. 3: Personal boundary can be enforced against hands, arms, or limbs

As illustrated in Fig. 3, the personal boundary is enforced in a volume, e.g., a capsule or a cylinder, that surrounds a virtual avatar, such that another virtual avatar cannot intrude in any manner, e.g., with feet, hands, arms, limbs, by teleportation, or in any other way. In Fig. 3, an avatar that attempts intrusion using his hands is automatically pushed away. In Fig. 3, an example control panel has been invoked in the background to indicate parameters of safe personal boundary to all. The control panel can also be used for real-time adjustment of the personal boundary.
In Fig. 4, a first virtual avatar attempts inadvertently to walk into the personal space of a second virtual avatar. The scene in Fig. 4 is depicted from the point of view of the second virtual avatar, who is not shown. As illustrated, the intruding (first) virtual avatar is automatically nudged or slid away to the side. The nudging away from a user’s personal boundary works regardless of whether one or more of the avatars is standing or in motion.

Per the techniques, personal boundaries cannot be used in an abusive manner, e.g., that affects the normal functioning of the virtual environment. For example, the personal boundary of a virtual avatar cannot block a narrow doorway by defining a large personal boundary, such that no one else can pass, or otherwise prevent normal movement of avatars in the VR environment. In such an event, an avatar can squeeze past the people attempting to block the doorway. However, even as the avatar pushes past the doorway, the doorway-blocker’s personal boundary is enforced such that the avatar is prevented from standing in their boundary for any substantial length of time. Similarly, a crowd of avatars cannot prevent another avatar from getting somewhere in the VR environment. As in real life, a virtual avatar can squeeze through such a
crowd to traverse it, even as the personal boundaries of individual avatars in the crowd prevent
the traversing avatar from standing in the crowd for any substantial length of time.

The personal boundary can be enabled by default for all users, with certain default
parameters, e.g., a radius of 0.6 meters. The default parameters can be set such that the avatar
remains unclipped and world mechanics of the VR environment function normally. The user can
configure the boundary to be completely sealed, e.g., allow no one, or the user can configure the
boundary to be selectively porous to varying degrees, e.g., it can allow friends in, or it can allow
members of a party (or game) in.

The radius of the personal boundary can also be selectively configured, e.g., friends can
encounter small personal boundary radii, while family members may have no boundaries for
each other. Strangers are configured to experience the widest personal boundaries. Party (or
game) members, even if strangers, can temporarily be granted a smaller personal boundary to
enable them to play or work together.

Users can also selectively allow breaks in the boundaries to enable activities such as
hand-shakes, fist-bumps, high-fives, etc. The boundaries revert to normal upon the close of a
party. Varying personal rules can be set up in different VR environments, e.g., art studio, dance
club, selfie mode, world builder, etc. For example, in an art studio VR environment, the personal
boundary can extend to include the avatar’s easel or other equipment, such that no other avatar
can touch or damage a given avatar’s properties.

If an avatar violates repeatedly the personal boundary of other avatars, then the personal
boundaries of the victims can be configured to automatically grow wider. Also, a subsequent
intrusion attempt results in the intruder being chased farther away.
In this manner, the techniques of this disclosure enable users in virtual environments to create and adjust personal boundaries for their avatar such that the user is in control. Other avatars cannot touch the avatar or be in their personal space unless specifically permitted. The personal boundary is implemented such that it doesn't get in the way of socializing or interacting with others, or in the normal functioning of the virtual environment. While the personal boundaries described herein are implemented to be forgiving of unintended or casual intrusions, the boundaries are enforced to assertively counter truly malicious users such that personal boundaries are enforced with appropriate balance. Moreover, the techniques promote positive social norms, e.g., normalize the notion of respect for people’s personal space.

CONCLUSION

This disclosure describes techniques that enable a user to create a personal boundary around their avatar in a virtual reality environment. The personal boundary is enforced by the virtual reality platform such that other avatars are kept a comfortable distance away. The enforcement of a personal boundary normalizes respect for personal space in virtual environments.