

Do we need to be in full control of our VR avatars?

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Abstract—In my early work I argued that automating avatars in online virtual environments could drastically improve social interaction, but those avatars were generally driven by keyboards and mice, rather than “fully embodied” as is the case in VR. However, I do think that some limitations in VR avatar control could also be addressed with automation, as long as we pay close attention to a few potential automation pitfalls.

In some of my earliest published works, I proposed that graphical avatars representing users in online virtual worlds, could automatically animate a range of nonverbal cues that would support social engagement and interaction [1]–[4]. This proposal addressed a major problem with online avatars at the time: They had to be explicitly controlled via mouse and keyboard in front of a monitor. This meant that a lot of the subtle and spontaneous human behavior supporting social interaction was lost. A user would, for example, not be quick enough to hit the “smile” and “raise eyebrows” buttons, to provide a warm interaction invitation when the gaze of an old friend briefly rested on their avatar. In fact, the user probably did not know exactly what “strings to pull” to produce an inviting sequence of nonverbal behavior, focused on the friend. To make matters worse, online virtual worlds typically relied on text chat for communication. The users would then let go of the avatar controls in order to type text, leaving their avatars idling.

In real-life our physical bodies are integral to social interaction and conversation, seamlessly and spontaneously producing a range of non-verbal behaviors such as conversational gestures, facial expressions and body postures. How then could the graphical avatar bodies possibly serve the communicative functions of real physical bodies, when the users were busy navigating the environments or typing messages?

The answer seemed relatively straight-forward: Let the avatars themselves be aware of the social context, monitor what the users were doing and then augment their actions by autonomously adding relevant and supportive non-verbal cues through animation. *Essentially, handing the spontaneous part of the social interaction over to “socially smart” avatar bodies.* This is not unlike giving player avatars in games “physical smarts” to produce the most realistic looking locomotion animation when traversing physically complex environments [5]. A couple of studies demonstrated that this approach can improve online social interaction [2]–[4].

Today we can socialize in online virtual worlds using powerful but affordable VR devices that dramatically change how avatars are handled. In VR, our own movements are

translated to that of the avatar instead of relying on keyboards and mice. We furthermore communicate using our own natural voice, rather than composing and transmitting text. At first glance, one might therefore dismiss the whole idea of avatar automation, since our natural and spontaneous behavior is effortlessly mimicked by the avatar.

However, there are a few reasons we may still want to consider making the VR avatar capable of autonomously animating helpful social behavior:

- 1) **Tracking Limitations** There are still limitations on what user behavior can be easily tracked. Typically only the hands and head are being tracked. Facial expressions are beginning to get included, but only to an extent. *Avatar automation could fill in everything that is not tracked.*
- 2) **Sensing Limitations** There are limitations on what users can sense. For instance touch is typically missing, and peripheral vision is crippled. *Avatar automation could produce expected spontaneous reactions to missed stimuli*
- 3) **Network Limitations** Tracked behavior needs to travel a long distance before getting portrayed by an avatar, potentially introducing an unwanted lag. *Avatar automation can produce reactive animation at the distant client, without network communication*
- 4) **User Limitations** The user may be unable to produce the desired behavior. This could be due to disability, external physical constraints or lack of skill. *Avatar automation could help users realize even complex social behavior, thus empowering them in the process*

While there is a clear opportunity to explore the automation of VR avatars further, some things need to be avoided when automation is considered:

- 1) **User discomfort.** E.g. when an avatar turns its head to smile towards a friend, rotating the camera should be strictly avoided. However, a HUD could indicate that a friend is approaching from the side.
- 2) **Social risks.** E.g. the avatar should avoid initiating a social exclusion behavior towards someone without that being an explicit choice.
- 3) **Inconsistent behavior.** E.g. when adding lower body motion and posture, it needs to be consistent with the personality and style expressed by the upper body.

If the avatars are effectively serving the social intentions of their users, without causing them any additional burden, they could be seen as intelligent digital augmentations, extending and strengthening our grip on the virtual world.

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